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THE BRITISH PHARMACEUTICAL CONFERENCE.

AN ORGANIZATION FOR THE ENCOURAGEMENT OF PHARMACEUTICAL RESEARCH AND THE PROMOTION OF FRIENDLY INTERCOURSE AMONGST PHARMACISTS.

This Association of Chemists and Druggists and others interested in Pharmacy is managed by about twenty unpaid officers annually elected by the members.

ANNUAL MEETINGS OF MEMBERS.

1863, NEWCASTLE. 1864, BATH. 1865, BIRMINGHAM. 1866, NOTTINGHAM. 1867, DUNDEE. 1868, NORWICH. 1869, EXETER. 1870, LIVERPOOL.
1871, EDINBURGH. 1872, BRIGHTON. 1873, BRADFORD. 1874, LONDON. 1875, BRISTOL. 1876, GLASGOW. 1877, PLYMOUTH.
1878, DUBLIN. 1879, SHEFFIELD. 1880, SWANSEA. 1881, YORK. 1882, SOUTHAMPTON. 1883, SOUTHPORT. 1884, HASTINGS. 1885, ABERDEEN.
1886, BIRMINGHAM. 1887, MANCHESTER.

The chief business of the meetings is the communication of written descriptions of original investigations made by members during the year, and includes discussions on such papers by the assembled members and visitors.

Presidents:—

1863-4, 1864-5, H. DEANE, F.L.S.; 1865-6, 1866-7, Prof. BENTLEY, M.R.C.S.; 1867-8, 1868-9, D. HANBURY, F.R.S.;
1869-70, 1870-1, W. W. STODDART, F.C.S.; 1871-2, 1872-3, H. B. BRADY, F.R.S.; 1873-4, 1874-5, T. B. GROVES, F.C.S.
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1884-5, J. B. STEPHENSON; 1885-6, T. GREENISH, F.C.S. 1886-7, S. R. ATKINS.

THE YEAR-BOOK OF PHARMACY AND TRANSACTIONS.

The Conference annually presents to members a handsome octavo volume of about 600 pages, containing the proceedings at the yearly meetings, and a report on the progress of pharmacy, or Year-Book, comprising abstracts of papers on pharmacy, materia medica, and chemistry, and on new preparations, processes, and formulae, published at home and abroad during each year. The funds of the Conference, composed of annual subscriptions of seven shillings and sixpence, are devoted to the production of this useful book, no pains being spared to make it the desk companion of the year, and an invaluable permanent work of reference for every chemist and druggist. The Executive Committee of the Conference trusts that members will show the current Year-Book to their friends and acquaintances—principals, assistants, or pupils—and obtain as large a number of new members as possible. Alphabetical lists of the names and addresses of subscribers will be found in each Year-Book.

NOMINATION FOR MEMBERSHIP.

Gentlemen desiring to join the Conference can be nominated at any time on applying to a Secretary or any other Officer or member. The Name and Address of each candidate should be written legibly, and forwarded to "The Secretary," British Pharmaceutical Conference, 17, Bloomsbury Square, London, W.C., together with the subscription.

THE ANNUAL SUBSCRIPTION.

The Conference Year commences on July 1st, and Annual Subscriptions are due in advance on that date. The amount, which includes free delivery of the Year-Book, is 7s. 6d. for members residing in any European country, Canada, or the United States of America. For those resident in other countries, if the Year-Book be mailed direct to members, it is as follows:—Australasian Colonies, 10s.; South Africa, India, China, and Japan, 9s. 6d.; West Indies and Mauritius, 8s. 10d. Remittances may be made by Postal or Post Office Order, crossed "& Co.," made payable to the *British Pharmaceutical Conference*, at the "High Holborn" Post Office, or by Cheque, and should be addressed as follows:—"*The Secretary, Brit. Pharm. Conf., 17, Bloomsbury Square, London, W.C.*"

To all members who have previously paid the Annual Subscription, the Year-Book, including Transactions, is posted as soon as published in December, and to other members immediately on receipt of the Subscription.

Extra copies of the Year-Book and Transactions for 1870 and subsequent issues, will be sent to members on receipt of Subscription as above, for each additional copy. To non-members, the price is Ten Shillings per volume, exclusive of postage.

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YEAR-BOOK OF PHARMACY

COMPRISING

ABSTRACTS OF PAPERS

RELATING TO

PHARMACY, MATERIA MEDICA, AND CHEMISTRY

CONTRIBUTED TO BRITISH AND FOREIGN JOURNALS,

FROM JULY 1, 1885, TO JUNE 30,

1886.

WITH THE

TRANSACTIONS

OF THE

BRITISH PHARMACEUTICAL
CONFERENCE

AT THE

TWENTY-THIRD ANNUAL MEETING

HELD AT

BIRMINGHAM,

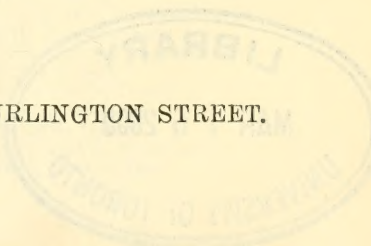
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COLLEGE OF PHARMACY
44 GERRARD ST. E.
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YEAR-BOOK OF PHARMACY AND TRANSACTIONS

OF THE

British Pharmaceutical Conference.

1885-86.

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1886

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BRITISH PHARMACEUTICAL CONFERENCE.

INAUGURAL MEETING HELD AT NEWCASTLE-ON-TYNE IN 1863.

Years.	Places of Meeting.	Presidents.	Vice-Presidents (Four).	Local Secretaries (One).
1864	Bath . . .	HENRY DEANE, F.L.S.	{ Prof. BENTLEY, F.L.S. { Dr. EDWARDS, F.C.S.	J. C. POOLEY.
1865	Birmingham	HENRY DEANE, F.L.S.	{ Prof. BENTLEY, F.L.S. { Dr. EDWARDS, F.C.S.	W. SOUTHALL, Jun.
1866	Nottingham	Prof. BENTLEY, F.L.S.	{ Dr. EDWARDS, F.C.S. { D. HANBURY, F.R.S.	J. H. ATHERTON, F.C.S.
1867	Dundee . .	Prof. BENTLEY, F.L.S.	{ D. HANBURY, F.R.S. { J. INCE, F.L.S.	J. HODGE.
1868	Norwich . .	DANIEL HANBURY, F.R.S.	{ R. FITCH, F.G.S. { J. INCE, F.L.S.	F. SUTTON, F.C.S.
1869	Exeter . .	DANIEL HANBURY, F.R.S.	{ G. COOPER { H. S. EVANS, F.C.S.	M. HUSBAND.
1870	Liverpool .	W. W. STODDART, F.C.S.	{ J. ABRAHAM { H. C. BAILDON	E. DAVIES, F.C.S. J. DUTTON (Birkenhead).
1871	Edinburgh .	W. W. STODDART, F.C.S.	{ J. ABRAHAM { H. C. BAILDON	J. MACKAY, F.C.S.
1872	Brighton . .	H. B. BRADY, F.R.S.	{ J. INCE, F.L.S. { R. REYNOLDS, F.C.S.	T. GLAISYER.
1873	Bradford . .	H. B. BRADY, F.R.S.	{ T. H. HILLS, F.C.S. { R. REYNOLDS, F.C.S.	R. PARKINSON, Ph.D.
1874	London . .	THOS. B. GROVES, F.C.S.	{ T. H. HILLS, F.C.S. { R. REYNOLDS, F.C.S.	M. CARTEIGHE, F.C.S.

1875	Bristol . .	Thos. B. Groves, F.C.S.	{ T. H. Hills, F.C.S. { R. Reynolds, F.C.S.	{ CHAS. DOUGLAS, { PETER SQUIRE, F.L.S.	{ J. PITMAN.
1876	Glasgow . .	Prof. Redwood, F.C.S.	{ T. H. Hills, F.C.S. { R. Reynolds, F.C.S.	{ E. C. C. Stanford, F.C.S. { D. Frazer.	{ A. KINNIMONT.
1877	Plymouth . .	Prof. Redwood, F.C.S.	{ T. H. Hills, F.C.S. { R. Reynolds, F.C.S.	{ A. P. Balkwill. { J. Williams, F.C.S.	{ R. J. CLARK.
1878	Dublin . .	G. F. Schacht, F.C.S.	{ Prof. Tichborne, F.C.S. { R. Reynolds, F.C.S.	{ R. W. Pring, L.A.H.D. { J. Williams, F.C.S.	{ W. HAYES.
1879	Sheffield . .	G. F. Schacht, F.C.S.	{ Prof. Tichborne, F.C.S. { R. Reynolds, F.C.S.	{ W. Ward, F.C.S. { J. Williams, F.C.S.	{ H. MALHAM.
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1881	York . . .	R. Reynolds, F.C.S.	{ Prof. Attfield, F.R.S. { R. Davison.	{ N. M. Grose. { C. Umney, F.C.S.	{ J. SOWRAY.
1882	Southampton	Prof. Attfield, F.R.S.	{ R. Chipperfield. { T. Greenish, F.C.S.	{ Prof. Tichborne, LL.D. { J. R. Young.	{ O. R. DAWSON.
1883	Southport .	Prof. Attfield, F.R.S.	{ M. Carteighe, F.C.S. { W. V. Radley.	{ C. Umney, F.C.S. { J. R. Young.	{ Wm. ASHTON.
1884	Hastings . .	J. Williams, F.C.S.	{ S. R. Atkins. { J. Bell.	{ M. Carteighe, F.C.S. { J. R. Young.	{ F. ROSSITER.
1885	Aberdeen . .	J. B. Stephenson . .	{ F. B. Benger, F.C.S. { M. Carteighe, F.C.S.	{ C. Ekin, F.C.S. { J. P. Kay.	{ A. STRACHAN.
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1887	Manchester .	S. R. Atkins, J.P.	{ M. Carteighe, F.C.S. { S. PLOWMAN, F.R.C.S.	{ C. Symes, Ph.D. { G. S. Woolley.	{ F. B. Benger, F.C.S.

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THE BRITISH PHARMACEUTICAL CONFERENCE.

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THE most important ways in which a member can aid the objects of the Conference are by suggesting subjects for investigation, working upon subjects suggested by himself or by others, contributing information tending to throw light on questions relating to adulterations and impurities, or collecting and forwarding specimens whose examination would afford similar information. Personal attendance at the yearly gatherings, or the mere payment of the annual subscription, will also greatly strengthen the hands of the executive.

A list of subjects suggested for research is sent to members early in the year. Resulting papers are read at the annual meeting of the members; but new facts that are discovered during an investigation may be at once published by an author at a meeting of a scientific society, or in a scientific journal, or in any other way he may desire; in that case, he is expected to send a short report on the subject to the Conference.

The annual meetings are usually held in the provinces, at the time and place of the visit of the British Association; that for 1887 will be held in Manchester, on Tuesday and Wednesday, August 30th and 31st.

Gentlemen desiring to join the Conference can be nominated at any time on applying to the Secretary, or any other officer or member. The yearly subscription is payable in advance, on July 1st. The amount, which includes free delivery of the Year-Book, is 7*s.* 6*d.* for members residing in any European country, Canada, or the United States of America. For those resident in other countries, if the Year-Book be mailed direct to members, it is as follows:—Australasian Colonies, 10*s.*; South Africa, India, China, and Japan, 9*s.* 6*d.*; West Indies and Mauritius, 8*s.* 10*d.* Further information may be obtained from

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17, Bloomsbury Square, London, W.C.

THE YEAR-BOOK OF PHARMACY.

The Conference annually presents to members a volume of about 600 pages, containing the proceedings at the yearly meeting, and an Annual Report on the Progress of Pharmacy, or Year-Book, which includes notices of all pharmaceutical papers, new processes, preparations, and formulæ published throughout the world. The necessary fund for accomplishing this object consists solely of the subscriptions of members. The Executive Committee, therefore, call on every pharmacist—principal, assistant, or pupil—to offer his name for election, and on every member to make an effort to obtain more members. The price of the Year-Book to non-members is ten shillings. The constitution and rules of the Conference, and a convenient form of nomination, will be found at page 349.

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INTRODUCTION.

WE again devote the opening pages of this book to a brief summary of its leading contents, and invite attention, in the first place, to the contributions of the year to the literature of chemistry. While the great majority of these continue to deal with the carbon compounds, as a natural consequence of the range and importance of these bodies, there is no falling off in the steady growth of the inorganic branch of the science, though by comparison the progress in this direction is much less striking. Selecting as a starting point the work done in connection with the chemical elements, we refer first of all to some further changes in the number of these substances. C. Winkler announces the discovery of a new non-metallic element, isolated by him from a mineral known as argyrodite, for which he proposes the name, "germanium" and the symbol Ge. A metal extracted from the orthite of Arendal is described by E. Linnemann as a new element under the name of "austrium." Its individuality as such, however, is called in question by L. de Boisbaudran, who infers from its published properties and mode of extraction that it may prove to be identical with gallium. Didymium, which has so long occupied a place in the list of elementary substances, is in danger of losing its position, since Dr. v. Welsbach claims to have succeeded in splitting up this body into two distinct metals, differing essentially in their atomic weights and spectroscopic properties. Should all these statements be confirmed, the number of known elements would thus be increased by three.

Recent observations respecting the action of steam on carbonic oxide at a high temperature have led to the discovery of a process for preparing pure hydrogen on a large scale at a cheap rate. For this purpose a current of vapour is decomposed over incandescent coke, hydrogen and carbon monoxide being evolved. A fresh quantity of steam is then brought into contact with the carbon

monoxide, and the mixture heated to the temperature of dissociation. A further production of hydrogen thus takes place, while the carbonic oxide is converted into carbon dioxide, which may be readily absorbed by lime water.

The first stage of the process for obtaining oxygen by heating potassium chlorate has all along been explained by the equation $2 \text{ K Cl O}_3 = \text{K Cl O}_4 + \text{K Cl} + \text{O}_2$. This view, however, is now shown to be erroneous by F. L. Teed, whose experiments lead to the conclusion that the decomposition of the chlorate occurs more in accordance with the equation $10 \text{ K Cl O}_3 = 6 \text{ K Cl O}_4 + 4 \text{ K Cl} + 3 \text{ O}_2$, or, if the heating of the salt be conducted very gently, according to the equation $22 \text{ K Cl O}_3 = 14 \text{ K Cl O}_4 + 8 \text{ K Cl} + 5 \text{ O}_2$. The general results are stated to fall within the limits calculated from these two representations. The same author finds that during the reduction of the perchlorate, in the second stage of the process, potassium chlorate is formed, but that this disappears again long before the complete decomposition of the perchlorate is effected. In the presence of manganese dioxide, the reduction of the perchlorate appears to take place without the intermediate formation of any chlorate.

J. S. Stas recommends a useful and very simple method for the purification of bromine, consisting in the distillation of a solution of the element in potassium bromide, with the addition of zinc oxide. Chlorine is thus retained as potassium chloride and iodine in combination with the zinc. The discrepancies in the published statements respecting the decolorization of the so-called iodide of starch on heating, and the return of the colour on cooling, have induced C. Tomlinson to reinvestigate this subject, with the result of showing that no such reproduction of the colour on cooling occurs provided the boiling be carried on for a sufficiently long time. The decolorization takes place at varying temperatures, according to the nature of the starch used, but is under all circumstances complete at the boiling point. A permanent solution of potassium iodide and starch for analytical purposes may be obtained, according to C. Reinhardt, by means of a suitable addition of potassium hydrate. Several new methods are published for the detection and estimation of iodine, bromine, and chlorine. In order to separate iodine from a mixture of chloride, bromide, and iodide, M. Dechan distils with a concentrated solution of potassium bichromate; after its complete expulsion, he repeats the distillation with the addition of sulphuric acid and water, when the bromine passes over, leaving the chloride

in the retort. G. Weiss prefers to remove the iodine by distillation with concentrated solution of ferric sulphate, and then to liberate the bromine by means of a slight excess of potassium permanganate, the operation being in both instances assisted by passing a current of air through the contents of the flask. G. Vortmann defends his well-known process for the direct determination of chlorine in the presence of bromine against the criticisms of Berglund, and quotes numerous test analyses showing that, when the amount of the chloride does not exceed that of the bromide, satisfactory results can be obtained under widely varied conditions of treatment. A defect in the volumetric estimation of chlorine by Mohr's method is pointed out by G. Biscaro, who asserts that its accuracy is impaired by the presence of nitrates. A new mode of titrating chlorine is suggested by E. Bohlig, who directs the liquid under examination to be boiled with magnesium carbonate and filtered, the filtrate to be agitated with an excess of dry silver oxalate, and—after a second filtration—the oxalic acid to be determined in the clear liquid by titration with decinormal permanganate solution in the presence of sulphuric acid. A. R. Haslam calls attention to the solvent action of hydrobromic and hydriodic acids on barium sulphate, which seems to be more than sufficient to seriously impair sulphuric acid estimations in the presence of either of the two acids named.

Sulphuric acid may be readily purified, as shown by M. Kupferschläger, by treating the moderately diluted commercial acid with an excess of washed sulphurous anhydride, then saturating it with sulphuretted hydrogen, allowing the sulphides of lead and arsenic to settle, and distilling the carefully decanted acid. For the detection of nitric acid and oxides of nitrogen in sulphuric acid, H. Hager proposes the application of dry granulated ferrous sulphate as obtained by precipitation with alcohol, in preference to the ordinary sulphate or its solution, on account of the greater delicacy of its indications. A. Rosa recommends the use of ammonio-ferrous sulphate in place of ferrous sulphate as a more sensitive reagent for the detection of nitrates in general. As a new and very delicate test for nitrates, W. H. Ince suggests a saturated solution of sodium phenolsulphonate in the presence of sulphuric acid. A. Grandval and H. Lajoux show that the detection and estimation of traces of nitrates in water may be readily effected by a process based on the conversion of nitric acid into picric acid by the action of a solution of phenol in sulphuric acid; the picric acid thus formed is neutralised with ammonia, and the colour of the

liquid compared with that of a solution of ammonium picrate of known strength.

The application of the permanganate test in water analysis is stated by A. Dupré to give more satisfactory results if the process be conducted in the presence of phosphoric instead of sulphuric acid, and at a very low temperature. A. J. Cooper has investigated the relative delicacy of the various tests for poisonous metals in potable water, and reports in favour of sulphuretted hydrogen. While engaged with determinations of lead in potable waters, L. T. O'Shea has made the interesting observation that filter papers possess in an appreciable degree the power of absorbing the salts of this metal from solutions passed through them, and of retaining it after washing. This phenomenon strikes us as somewhat analogous to the fixing of many metallic salts, and other substances used as mordants, on the fibre of cloth, and leads us to infer that salts of copper, tin, aluminium, and other metals, may probably also be retained by filter papers under certain conditions. We beg to suggest experiments in this direction.

The purification of impure drinking waters by means of alum is strongly advocated by P. T. Austin and F. A. Wilber, who find that this treatment not only clarifies the water, but also removes disease germs and ptomaines. From 1 to 2 grams of the alum should be dissolved in 60 litres of the water, which should then be allowed to stand for about forty-eight hours, and afterwards decanted or filtered from any precipitate formed.

M. Meinecke describes a modification of the molybdate method of estimating phosphoric acid, which promises to shorten the process materially. According to this author, the yellow precipitate obtained with ammonium molybdate need only be heated to from $400-500^{\circ}$, and the black residue of molybdenum phosphomolybdate weighed; the latter is said to have a constant composition, and to contain 4.018 per cent. of P_2O_5 .

Analysts are indebted to J. K. Bayer for a very convenient process for the volumetric estimation of alumina. The acid alumina solution is mixed with sufficient soda to re-dissolve the precipitated alumina. It is then divided, and equal portions titrated with sulphuric acid, using in one case litmus, in the other tropæolin as indicator. With litmus the reddening commences as soon as the free soda, as well as that present in the form of aluminate, are neutralized. With tropæolin an additional quantity of acid, being that required to convert the alumina into sulphate, is required before the change from yellow to orange begins. R. W.

Atkinson prefers phenolphthalein to litmus as an indicator in the first stage of this process, and is supported in this view by the author of the process. The determination of potassium as platino-chloride may be carried out volumetrically, according to M. Dubernard, by precipitating with a solution of sodium platino-chloride in weak alcohol, then removing the excess of platinum from the filtrate by means of zinc dust, and titrating the chlorides in the filtered solution with silver nitrate. E. Bohlig furnishes a very sensitive and simple test for the detection of bicarbonate in potassium monocarbonate. If the solution of the carbonate gives a white precipitate on the addition of a minute quantity of silver nitrate, bicarbonate is present. This is confirmed by similarly treating another portion of the carbonate which has been previously ignited; in this case a dark coloured precipitate is produced. The occurrence of potassium nitrite, in quantities varying from 0.3 to 1.0 per cent., in commercial caustic potash, is pointed out by W. Dunstan. L. Garnier directs attention to the occasional presence of traces of arsenic in potassium chlorate, emanating from impure chlorine employed in the manufacture of the salt, an observation which should not be lost sight of in chemico-legal investigations. For the separation and detection of arsenic in such investigations, H. Beckurts recommends the distillation of the comminuted substances with pure hydrochloric acid and a large proportion of a 4 per cent. solution of ferrous chloride. R. Fresenius recommends a new method of separating gold and platinum from arsenic, antimony, and tin in qualitative analysis. It is based on the observation that tin, arsenic, and antimony are volatilized as chlorides on heating their sulphides with an excess of an intimate mixture of dry ammonium chloride and ammonium nitrate; while gold and platinum are left behind in a metallic state when their sulphides are treated in the same way.

Dealing with the preparation of mercurous iodide, G. A. Haffa suggests precipitation of mercurous nitrate with potassium iodide as the best mode. In this manner, either a green or yellow product may be obtained, according to the density of the solutions employed.

Among the vegetable alkaloids discussed in the scientific journals of the year, cocaine has attracted the greatest share of attention. The close relation existing between this base and benzoyl-ecgonine, as shown by the researches of Calmels and Gossin, as well as those of B. H. Paul, receive the fullest confirmation at the hands of Z. H. Skraup and W. Merck, both of whom

find that benzoyl-ecgonine is always obtained as a by-product in the preparation of cocaine, and that the latter may be artificially prepared from the former by the action of methyl iodide. B. H. Paul further reports that a salt sold as cocaine-benzoate, and obtained from a well-known French source, has proved on examination to be identical with the body previously described by him as produced by the action of water and heat upon cocaine—viz., benzoyl-ecgonine, and to contain no benzoate of cocaine at all. An interesting observation, recorded by F. Giesel, and confirmed by Lyons, shows that cocaine possesses the power of forming a permanganate, which is obtained as a violet precipitate on mixing a strong solution, of the hydrochlorate with a weak one of potassium permanganate, and that this reaction affords a valuable test for the detection of cocaine.

The marked alkalinity of atropine, to which attention was directed a few years ago by A. W. Gerrard, in connection with the action of this base on solutions of mercuric chloride, has induced the same author to extend his observations to its reaction with mercurous salts, with the result of showing that when mercurous chloride, nitrate or acetate, is warmed with atropine in the presence of water, mercurous oxide is precipitated and a salt of atropine formed. By suitable manipulation, this reaction can be obtained with less than 0.001 gram of the alkaloid, and thus constitutes a very delicate test. Other tests for the same base are described by F. A. Flückiger, who also confirms Gerrard's observations.

Two new reactions of morphine are published by J. Donath. The reagents employed being potassium arseniate and a sulphuric acid solution of potassium chlorate respectively; the former of which produces a fine violet blue, and the latter a persistent grass-green coloration on being added to solutions of traces of the alkaloid in a few drops of strong sulphuric acid. A solution of 1 gram of ammonium selenite in 20 c.c. of concentrated sulphuric acid is recommended by P. Lafon as a very delicate test for codeine, with one-tenth of a milligram of which it is stated to produce a magnificent green coloration. D. B. Dott describes a crystalline lactate of morphine, answering to the formula, $C_{17}H_{19}NO_3 \cdot C_3H_6O_3$, which seems to be the only morphine salt crystallizing from water as an anhydrate. Recent analyses of papaverine, and of a large number of its salts, by C. Goldschmidt, confirm the correctness of the formula, $C_{20}H_{21}NO_4$, assigned to this alkaloid by Merck and others. A new narcotic

base, introduced under the name of hopeine, and claimed to be a principle extracted from wild American hops, has proved on examination by B. H. Paul, and also by A. Ladenburg, to be morphine, and in the case of some specimens a mixture of morphine with a variable proportion of cocaine; but the question whether the introduction of this substance is a mere fraud, or whether the wild hop of Central America contains either or both of the two alkaloids named, remains for the present undecided.

The well-known chromate test for strychnine is recommended by F. A. Flückiger in a modified form, consisting in the application of a test solution obtained by dissolving one centigram of the chromate in 5 c.c. of water, and adding 15 grams of strong sulphuric acid at 15° C. On dropping the strychnine solution into this reagent, or sprinkling the solid alkaloid with it, the characteristic blue coloration is produced; but the test fails with mixtures of strychnine and brucine containing more than 10 per cent. of the latter. Most of the other researches on the nux vomica alkaloids referred to in this volume deal with decomposition products, derivatives, and products of oxidation of these bases.

The aconitines have received the attention of A. Jürgens and K. F. Mandelin, the latter of whom furnishes a *résumé* of the entire literature of the subject. More recently still, some valuable information respecting the preparation and purification of crystallized aconitine from the tubers of *Aconitum Napellus* has been communicated by J. Williams to the Birmingham meeting of the British Pharmaceutical Conference.

De Vrij's statement that commercial quinine sulphate contains a large proportion of cinchonidine, is called in question by A. J. Cownley, who finds that such is only the case with inferior kinds of this salt. O. Hesse arrives at the same conclusion, and shows that the optical method of quinine testing cannot be depended upon for its indications, since commercial quinine sulphate contains hydroquinine, which acts upon the plane of polarized light in a way different from quinine and cinchonidine, and thus exercises a disturbing action on the test. His latest experience leads him to infer that up to the present moment no optical test is known by which the amount of cinchonidine can be determined, either in commercial quinine salts or in cinchona bark, with any satisfactory degree of accuracy. De Vrij describes a modification of the ether process of assaying quinine sulphate as sufficiently accurate for the detection of cinchonidine in quantities not less than 2 per cent. Y. Shimoyama has critically examined De Vrij's method of estima-

ting quinine as herapathite, which he finds to be fallacious in the presence of a large proportion of cinchonidine. He also reports unfavourably on Heilbig's process for the determination of quinine in a mixture of cinchona alkaloids, and recommends a process of his own for this purpose. A. Vogel modifies his original test for the detection of quinine, consisting in the application of bromine water, yellow prussiate of potash, and borax, by substituting for the latter a compound of weaker alkalinity, such as marble, felspar, or powdered glass. Quinine hydrate, as obtained either by precipitation with ammonia, or by the evaporation of an ethereal solution, is found by F. W. Fletcher to be invariably a combination of the alkaloid with only one molecule of water. F. A. Flückiger and O. Hesse are of opinion that, although monohydrate and dihydrate of quinine may exist in an amorphous form, the only crystallized hydrate as yet known is the trihydrate. Attention is again called to the destructive action of lime on quinine, which is stated by A. R. Haslam to be very appreciable even at moderate elevations of temperature. In a further report on cupreine and homoquinine, O. Hesse discusses the nature of the latter, and gives his reasons for regarding it merely as a compound of quinine and cupreine, and not as a distinct alkaloid.

Further experiments in the direction of the synthesis of coniine by A. Ladenburg, have yielded a body agreeing in almost all its properties with the natural base, but differing from it in the melting point of its hydrochloride, so that the identity remains still uncertain.

A few more observations will conclude our notice of the vegetable alkaloids in this place. A new crystalline base, described under the name of "ulexine," and obtained by A. W. Gerrard from the seeds of the common furze, is brought by him under the notice of the profession in a contribution to the recent meeting of the British Pharmaceutical Conference. In a report communicated to the same meeting, W. A. H. Naylor supplies some further information respecting hymenodictyonine, the alkaloid isolated by him from the bark of *Hymenodictyon excelsum*. The behaviour of this base with oxidizing agents points to its constitutional relation to the pyridine series. A further study of the properties and reactions of hydrastine by A. B. Lyons, and also by F. B. Power establishes the fact that the fluorescence occasionally observed, in solutions of this body, and in pharmaceutical preparations of *Hydrastis Canadensis*, is due to an oxidation-product of the alkaloid, which may be readily developed from it by the action of a few

drops of weak permanganate solution in the presence of free sulphuric acid. The intense blue fluorescence thus produced is stated to afford excellent means for the identification of this base.

Commercial saponin is shown by R. Kobert to consist of a mixture of at least four organic and some inorganic substances. Of the former, pure saponin, $C_{13}H_{30}O_{10}$, and lactosin are inert: while the third and fourth constituents, which the author has named quillaic acid and sapotoxin, are very poisonous and acrid. Chrysarobin, the active principle of goa powder, and its decomposition product, chrysophanic acid, are discussed in a report by A. Petit.

Hanriot has studied the action of hydrogen peroxide on benzoic acid in the presence of sulphuric acid, which he finds to result in the formation of salicylic acid along with a small quantity of another acid still under investigation. A new method for the detection of salicylic acid is described by Curtman, and is based on the conversion of this substance into salicylate of methyl (oil of gaultheria), and the recognition of the latter by its odour. Salicylate of phenol, which, under the name of salol, is attracting much attention as an antiseptic, forms the subject of a paper read by J. Moss, before the British Pharmaceutical Conference at its recent meeting. The reddening of carbolic acid, which has been erroneously attributed to the presence of rosolic acid, is traced by A. Kremel to an organic compound formed in the acid by the action of certain metals. Processes for the assay of carbolic acid are published by J. Toth and T. Salzer.

The tediousness of tannin estimations by the most approved processes is so well-known that any improvement or simplification not impairing the result must be welcome to those engaged in such analyses. As a useful step in this direction, we allude to a new volumetric method suggested by E. Durien, which is based on the formation of a black or green coloration by ferric chloride, and the destruction of this coloration by the gradual addition of solution of chlorinated lime. For the titration of citric acid by means of standard soda solution, F. Watts recommends the use of turmeric as an indicator, which he finds to be applicable even in the case of dark coloured liquids such as concentrated lemon or lime-juice of commerce.

The new Pharmacopœia test for the purity of ether is unfavourably criticised by E. A. Werner, who points out that the liberation of iodine from potassium iodide is not due to any actual impurity in the ether thus tested, but is a result of its decomposition. H. W. Jones deals with the detection of methyl-

ated ether, and shows under what conditions and to what extent this may be accomplished by fractional distillation.

W. Fox and J. A. Wanklyn publish a new process for the estimation of glycerin, which is based on the fact that the substance, when oxidized with potassium permanganate in a strongly alkaline solution, yields oxalic acid, water, and carbonic anhydride. From the amount of oxalic acid thus formed, that of the glycerin may be readily calculated.

A body stated to be benzoylsulphonic-imide has recently been introduced under the name of saccharin, on account of its intense sweetness, which is claimed to be more than two hundred times as great as that of cane-sugar. It is not injurious to health, and is recommended as a sweetening agent for the food of diabetic patients.

The recent contributions to the subject of urine testing will be found to comprise new processes for the detection of albumen, blood, and bile, as well as researches on the estimation of urea. With reference to the alleged occurrence of alkaloidal constituents in urine, A. Villiers states that normal and healthy urine does not contain such bodies, but that they are invariably to be found in urine passed by persons suffering from indisposition. In connection with ptomaines, it may not be out of place here to allude to the very interesting and important observation by A. G. Pouchet, that the pure cultivation-broth of Koch's microbe yields traces of a liquid alkaloid which appears to be identical with that already isolated from the dejections of cholera patients.

Reports on pepsin, on the nature and action of papain, the diastatic action of saliva, the assimilation of fats, and the physiological action of potassium chlorate will also be found among the contributions to the literature of physiological chemistry referred to in this volume.

The new remedies discussed during the past year are not all new in the strict sense of the term, since some of them have met with previous notices. P. Zipperer calls attention to the root of *Parameria vulneraria*, which is used by the natives of the Philippine Islands to furnish a balsam possessing remarkable healing properties when applied to wounds and sores. The root of *Nabalus albus* is recommended, in the form of a tincture, as a useful remedy in anemic diarrhœa, chronic dysentery, and in typhoid fever, on account of its tonic and astringent properties. Homeriana, the root of *Polygonum aviculare*, which was formerly used as a vulnerary and styptic, has recently been tried with success by Russian doc-

tors in cases of bronchitis and whooping cough. The root-bark of *Piscidia erythrina*, known in America as "Jamaica dog-wood," promises to be of much value in the treatment of neuralgia. Until quite recently this drug was considered as a hypnotic, but it is now found that it principally acts as an anodyne, and that sleep is not its direct effect, but is produced in consequence of the cessation of pain. Quillaia bark, administered in the form of a decoction, is regarded by R. Kobert, as superior to senega as an expectorant, as it contains the same glucosides in larger proportions, and is not liable to cause either diarrhœa or vomiting. J. H. Hill reports very favourably on the astringent properties of the American rag-weed, *Ambrosia Artemisiæfolia*, which render it valuable as a styptic. Recent observations on "pichi," the branches and leaves of *Fabiana imbricata*, by Dr. Rusby, testify to the value of this Chilian solanaceous plant as a remedy in urinary affections. Strophantin, a new diuretic, is stated to be derived from *Strophanthus hispidus* (*S. Kombé*, Oliver), from which negroes in Mungua, Senegambia, and Guinea prepare an arrow-poison called *kombé* or *inée*. The hypnotic properties of *Withania somnifera*, a solanaceous plant very common along the shores of the Mediterranean, are traced by Trebut to the presence of an alkaloid, for which he proposes the name "somniferine." *Lantana Brasiliensis*, which is described as an antipyretic superior in its action to quinine, is also found to owe its efficacy to the presence of an alkaloidal principle. *Pangium edule*, a tree indigenous to the East Indian islands, and belonging to the natural order *Bixaceæ*, is brought under the notice of the profession on account of the anthelmintic and narcotic properties of its bark, leaves, fruit, and seeds. The fruit of *Syzygium jambolanum* is reported to be a promising remedy in diabetes, causing a rapid decrease in the amount of urine as well as in the proportion of sugar. A new remedy for cancer and ulcers is described under the name of "alveloz," as a South American plant belonging to the order *Euphorbiaceæ*. *Lycopodium Saussurus*, which is known in Brazil by the name of "piligan," is referred to by M. Adrian as a powerful emetic and cathartic, owing its action to the presence of an alkaloid. *Polyporus Senex*, a gigantic species of agaric found on the coast of Chili, has been successfully administered by M. Grossi to arrest night sweats, and also as a styptic. An interesting series of observations upon the physiological effects of kava, a resinous extract obtained from the root of *Piper methysticum*, is published by Dr. Lewin, who shows this substance to be

a powerful local anæsthetic analogous in its action to cocaine. Much attention has also been attracted of late by two new hypnotics introduced under the names of "hypnone" and "urethane" respectively, the former of which is acetophenone, a colourless, mobile, refractive liquid, answering to the formula $C_6H_5 \cdot CO \cdot CH_3$, while the latter is a synthetically prepared body in the form of white crystals, and is described as the ethyl ether of carbaminic acid.

The drug known as Rio ipecacuanha has been examined microscopically by W. Kirkby, who arrives at the conclusion that it is not the root of *Ionidium Ipecacuanha*, as generally supposed, since the latter differs essentially in its structure from the Rio drug. The assay of ipecacuanha forms the subject of two papers—one by A. B. Lyons, the other by H. W. Jones. A new variety of rhatany imported from Guayaquil is described by E. M. Holmes, and shown to contain a larger proportion of tannin than the Peruvian drug, but less than either the Savanilla or Pará varieties. The separate bark of the Guayaquil root, however, is found to be twice as rich in tannin as either of these two. In a communication to the British Pharmaceutical Conference, W. Kirkby directs attention to a false pareira brava imported from the West Indies, and gives a full description of the histological peculiarities of both root and stem of the spurious drug. Toxic properties are attributed to sassafras by C. L. Hill, in whose opinion this root it not the innocent agent it has been supposed to be. It is stated to combine some of the properties of opium, nux vomica, and ergot. Y. Shimoyama gives a description of two kinds of non-poisonous aconite tubers from India, both of which he is inclined from the results of his examination to regard as varieties of the same species, *Aconitum heterophyllum*, though one of them, known as "wakmah," has been referred to *A. palmatum*. A report on North American aconites by J. U. and C. G. Lloyd deals with *Aconitum uncinatum*, and *A. Fischeri*, the latter of which is the only American source of aconitine for medicinal purposes. C. J. H. Warden and L. A. Waddell publish a lengthy account of the history and the botanical, microscopical, and medicinal characters of madar, a popular Indian drug obtained from two plants belonging to the order *Asclepiadiaceæ*, viz. *Calotropis gigantea*, and *C. procera*.

The medicinal properties of the Rhamnus barks have engaged the attention of G. W. Kennedy, whose experiments lead to the conclusion that the bark of *Rhamnus Purshiana* is preferable as a laxative to that of *R. catharticus*. E. Heckel and F. Schlagden-

hauffen supplement their previous reports on doundaké bark by a copious description of its botanical source, *Sarcocephalus esculentus*, and of the two varieties of the bark obtained from Sierra Leone and from Boké. They also show that the bitterness and physiological action of both are due to two nitrogenous colouring principles of a resinoid nature, and that the alkaloid described under the name "doundakine" does not exist.

Tumbeki, a Persian drug, consisting of the leaves of *Nicotiana Persica*, forms the subject of some notes by E. M. Holmes, showing the Shiraz variety to be the most esteemed, and twice as valuable as those of Keehan and Teheran. According to analyses by E. J. Eastes and W. H. Ince, this drug contains nicotine varying in proportion from 2 to 5·8 per cent. in the different qualities.

The literature of sandal woods has received some valuable additions in the shape of contributions from A. Petersen and W. Kirkby.

E. M. Holmes furnishes a very interesting account respecting the ergot of diss, a drug deriving its name from the reed on which it grows, which is called diss by the Arabs of Algeria. It is stated to be less hygroscopic and twice as active as ergot of rye, and to be obtainable at a much lower price.

A variety of musk derived from the American musk rat (*Fiber Zibethicus*), which has been repeatedly suggested as a possible substitute for the more expensive variety of musk for use in perfumery, is referred to in a paper read before the British Pharmaceutical Conference by C. Symes, who does not express a very favourable opinion of its suitability for that purpose, on account of its rancid odour.

Chemical research has again been extended to a considerable number of vegetable drugs. An investigation of the root of *Danais fragrans* by E. Heckel and F. Schlagdenhauffen furnishes proof that, contrary to the statement of Bourdon, this root contains no alkaloid, but owes its therapeutic properties to its colouring principle. The manaca root of Brazil (*Franciscea uniflora*) is reported to contain a powerfully purgative and diuretic alkaloid, possessing also diaphoretic and emmenagogue properties. M. Thoms has isolated from the rhizome of *Acorus Calamus* an amorphous bitter principle and a crystalline alkaloid, for which he proposes the names "acarin" and "calamine" respectively. The absence of an alkaloidal principle in *Hamamelis Virginica* is established by J. Marshall and H. C. Wood, who attribute the medicinal properties of this plant to the large proportion of

tannic and gallic acids contained in it. Some recent researches on belladonna deal with the fluorescent constituent occurring in different parts of the plant. H. Kunz describes this body under the name of *chrysotropic acid*, and assigns to it the formula $C_{12}H_{10}O_5$; while H. Paschkis finds its composition to answer to the formula $C_{10}H_8O_4$, and believes it to be identical with scopoletin, obtained by Eykman from *Scopolia japonica*. An examination of cascarilla bark by Boehm reveals the fact that this drug contains, in addition to its hitherto known constituents, an alkaloid closely allied to choline. Copalchi bark, which was first brought into Europe under the name of Trinidad or Cuba cascarilla, has yielded to E. Schmidt a bitter principle soluble in water and alcohol. *Lobelia nicotianæfolia* is found by V. Rosen to contain a liquid alkaloid corresponding to the lobeline obtained from *L. inflata*, and a solid crystalline base soluble in chloroform. In a contribution to the chemistry of coca, Prof. Bignon reports that cocaine is the only crystallizable alkaloid contained in the fresh or in recently dried leaves that have not undergone any fermentation; also that the leaves, exhausted completely of their natural alkaloid (cocaine), and submitted to the action of alkalis at a temperature of $100^{\circ}C.$, yield upon distillation a new volatile base having a very strong odour. C. J. Bender arrives at similar conclusions, and announces the isolation of an amorphous base to which he gives the name "cocaicine." The alkaloids of Jaborandi have received an addition of two of their number, which E. Merck describes under the names of "pilocarpidine" and "jaboridine." H. Bungener rejects the view that the resin of hops is the bitter principle of the drug, and contends that lupulic acid, the crystalline body first obtained in an impure state by Lerner, ought to be regarded as the bitter principle. A large number of drugs, besides those already referred to, which have likewise formed subjects of chemical, medical, or pharmaceutical research during the year, must be left unnoticed in this place, since the briefest reference to them, beyond their mere mention by name, would alone occupy the greater part of the space usually devoted to this introductory chapter.

W. I. Clark issues a protest against evaporation in the manufacture of fluid extracts and similar preparations, and pleads in favour of a careful system of percolation and re-percolation, which he finds to yield superior products without recourse to evaporation. W. H. Ince describes a modified extraction apparatus, intended for liquids of high boiling points, which is so constructed that the

vapour is conveyed through the centre of the substance to be exhausted." Dealing with the preservation of extracts, C. J. Davey suggests the addition of a suitable proportion of glycerin, to obviate the difficulty of keeping the officinal extracts at their proper consistence. The process of the new Pharmacopœia for the preparation of liquid extract of cinchona is found by B. H. Paul, and also by J. E. de Vrij, to share, to a great extent, the defects of the older method, in not securing anything like a complete exhaustion of the bark. The same opinion is also expressed by H. H. Millhouse, who arrives at the conclusion that a good process for the preparation of this extract, involving no notable loss of alkaloids, is still a desideratum. The results of an examination of commercial specimens of the same extract by W. F. Southall show a great and unsatisfactory variability in strength and quality. Similar results are obtained by W. Dunstan and F. Ransom with commercial specimens of the alcoholic extract of belladonna, the differences observed being so great that these authors find themselves unable to attribute them entirely to a corresponding variation in the alkaloidal strength of the root. They consider them partly due to differences in the proportions of alcohol and water employed. Trade specimens of extract of opium examined by W. P. Want also show deplorable variations in strength, while the results obtained by him with specimens of tincture of opium are fairly satisfactory. A process for the preparation of a permanent tincture of kino which is not liable to gelatinization is published by R. Rother.

The instability of ethyl nitrite and its solutions in alcohol has induced J. Williams to try the effect of glycerin, which had previously given him such good results in the preservation of hydrocyanic acid; and in this case, too, it has not disappointed his expectations. The great liability to change of the officinal spirit of nitrous ether is illustrated by experiments recorded both by G. E. Perry and E. Davies. G. H. Seward suggests a modification in the formula for preparing aromatic spirit of ammonia, consisting in the use of a smaller quantity of water in the distillation and a corresponding larger proportion for dissolving the carbonate of ammonia. In this manner he claims to obtain a product of superior flavour. The official directions for preparing compound spirit of ether meet with strongly adverse criticism from D. B. Dott, in whose opinion, moreover, the introduction of this preparation is a retrograde step.

W. Baxter finds the turpentine liniment of the Pharmacopœia

an unsatisfactory preparation, and obtains a much more uniform and permanent mixture by using double the quantity of water ordered. The process for the preparation of belladonna liniment is shown by F. Ransom to involve a considerable waste of spirit, and to succeed much better if the root be used in the form of a somewhat coarser powder.

The changes occurring in ipecacuanha wine through the agency of natural constituents of the wine and atmospheric oxidation, lead J. C. Shenstone to the suggestion to replace the wine in this preparation by a mixture of water and spirit, with a suitable addition of glycerin and a small proportion of malic acid.

We must not omit to call the reader's attention to an interesting report by N. H. Martin on the results of his examination of a number of specimens of tincture and extract of *nux vomica*. The conclusion arrived at by this author is that uniformity of alkaloidal strength is not attained by the Pharmacopœia process, even when it is strictly adhered to, and that the tendency towards excessive potency in these preparations, coupled with their liability to change through spontaneous evaporation, may be attended with inconvenience and danger.

The *Year-Book of Pharmacy* for 1886 contains a larger number of abstracts than any of the preceding volumes, a fact which, we trust, will increase the general usefulness of the work.

CHEMISTRY.

YEAR-BOOK OF PHARMACY.

PART I.

CHEMISTRY.

Germanium, a New Element. C. Winkler. (*Ber. der deutsch. chem. Ges.*, xix. 210.) The author announces the discovery of a new non-metallic element, which he has isolated from a mineral known as "argyrodite." He proposes for it the name "germanium," and the symbol Ge. Further particulars are promised in a future communication.

Announcement of the Discovery of a New Metal. E. Linnemann. (*Monatshefte für Chemie*, April, 1886.) The author gives a description of the chemical and optical properties of a metal extracted from the orthite of Arendal, and regarded by him as a new element, for which he proposes the name "austrium." A further report on this subject is to follow.

The alleged Discovery of a New Metal, Austrium. L. de Boisbaudran. (*Comptes Rendus*, June 21, 1886.) The properties of the metal austrium, and its mode of extraction, as described by E. Linnemann (preceding abstract), lead the author to doubt its individuality as a new element. He is inclined to believe that it may prove to be identical with gallium.

Non-Elementary Nature of Didymium. Dr. von Welsbach. (*Monatshefte für Chemie*, vi. 477.) The author claims to have succeeded in splitting up didymium into two new elements, differing considerably in their atomic weights and spectroscopic properties. The names and symbols proposed by him for these new metals are "praseodymium" (Pr) and "neodymium" (Ne).

Purification of Bromine. J. S. Stas. (*Zeitschr. für Analyt. Chem.*, xxv. 213.) The author recommends that the bromine be

dissolved in potassium bromide, and distilled, with the addition of zinc oxide. The potassium retains the chlorine and the zinc the iodine.

The Solubility of Chlorine in Water and Saline Solutions. W. L. Goodwin. (*Trans. Royal Soc. Edinb.*, xxx. 597-618.) The solubility of chlorine in water increases with a rise of temperature until a maximum is reached at 10-11°; from this point the solubility decreases. The result is to be explained by the solution of the solid chlorine hydrate, which is subsequently decomposed, thus resolving the phenomenon to the simple case of the solubility of gas in a liquid. Similar results were obtained with the chlorides of the alkali metals, although the presence of these salts induces the decomposition of the chlorine hydrate at a somewhat lower temperature than pure water; whilst the chlorides of magnesium, calcium, iron, cobalt, and strontium prevent the formation of the chlorine hydrate. In these cases, however, the solubility of the chlorine seems to follow the same general course; for the curves representing the solubility as a function of the temperature are flat at the maxima points, while from them the descent is very gradual. The occurrence of maxima points in the case of these salts can be explained as the results of two opposing forces, namely, the solubility of the chlorine in the water, not chemically combined with the salt, and the attraction of the chloride for the water, which thus determines the amount of uncombined water. As the temperature falls, the amount of free water decreases, whilst the coefficient of absorption increases at a quicker rate; therefore, on the whole, the solubility increases as the temperature falls.

But in all cases examined there is a general tendency towards coincidence at high temperatures. The curves for solutions containing two chlorides, each of which permits the formation of chlorine hydrate, follow the mean course between those of the chlorides taken separately; although this is not the case when only one or both prevent the formation of the hydrate.

The solubility of chlorine in water is increased by the presence of hydrochloric acid, and of lithium, and possibly of strontium chlorides.

As a general result, it may be stated that the presence of chlorides affects the solubility of chlorine, *chemically* at low, but *mechanically* at high temperatures. The explanation of the phenomena presented is thus based upon both of the theories enunciated above.

The Action of Steam on Carbonic Oxide. H. B. Dixon. (Abstract of a paper read before the Chemical Society, December 17, 1885. From the *Society's Proceedings*.) The action of steam in determining the union of carbonic oxide and oxygen has been explained by the author as leading to an alternate reduction and oxidation, whereby the hydrogen conveys the oxygen to the carbonic oxide: (1) $\text{CO} + \text{H}_2\text{O} = \text{CO}_2 + \text{H}_2$; (2) $2\text{H}_2 + \text{O}_2 = 2\text{H}_2\text{O}$. This explanation has been rejected by Moritz Traube (*Ber. der deutsch. chem. Ges.*, 1885, p. 1890), on the ground that carbonic oxide does not decompose steam at a high temperature. Traube represents the influence of steam as consisting in the formation from it of peroxide of hydrogen, which oxidizes carbonic oxide, steam being re-formed.

The author has already shown that steam is decomposed by carbonic oxide at a high temperature; for when carbonic oxide is exploded in presence of steam, with insufficient oxygen to completely burn it, the carbon dioxide formed is more than double the oxygen, and hydrogen is found in the residue. Horstmann arrived at the same conclusion.

When sparks are passed through a mixture of steam and carbonic oxide, carbon dioxide and hydrogen are formed until a certain fraction (which varies with the nature of the spark) of the carbonic oxide is turned into carbon dioxide.

When sparks are passed through a mixture of carbon dioxide and hydrogen, carbonic oxide and steam are formed until a certain fraction of the carbon dioxide is turned into carbonic oxide.

In neither case is the reaction complete. An equilibrium is reached when about 10 per cent. of carbon dioxide is present to 90 of carbonic oxide.

By the prolonged passage of the sparks a considerable quantity of formic acid is produced.

When a coil of platinum wire is heated to redness in steam and carbonic oxide, carbon dioxide and hydrogen are formed until from 10 to 15 per cent. of the carbonic oxide has been oxidized. Similarly, when a coil of platinum wire is heated in carbon dioxide and hydrogen, carbonic oxide and steam are formed until the corresponding limit is reached. No formic acid is produced. When a coil of wire is maintained at a red heat in a mixture of carbonic oxide and steam, and the carbon dioxide formed is removed by means of a dilute solution of potash, the carbonic oxide is in time completely oxidized to carbon dioxide, with the liberation of the corresponding volume of hydrogen. Again, when a

coil of platinum wire is maintained at a red heat in a mixture of carbon monoxide and hydrogen, and the steam formed is removed by means of phosphoric oxide, the carbon dioxide is in time completely reduced to carbonic oxide.

Since these experiments were made, Naumann has shown that when carbonic oxide and steam are heated in a tube to 950° , 10.5 per cent. of carbonic oxide is turned into carbon dioxide.

New Process for Producing Hydrogen on a Large Scale. MM. Hembert and Henry. (*Chem. and Drugg.*) The authors have discovered a process for producing pure hydrogen at a cheap rate. In the first stage a current of vapour is decomposed over incandescent coke, hydrogen and carbon monoxide being evolved. A fresh quantity of vapour is brought into contact with the carbon monoxide, and the mixture is heated to the temperature of dissociation. A further production of hydrogen then takes place, and the carbon monoxide is changed into carbon dioxide, which it is easy to absorb by lime-water. It appears that by the above method 1,000 kilograms of coke yield 3,200 cubic metres of hydrogen. The cost of the gas is said not to exceed a centime and a half per cubic metre, or about 30 cubic feet.

Solubility of Sulphur in Alcohol. A. G. Bloxam. (*Chemical News*, liii. 181.) Sulphur is deposited in white prisms from its solution in hot alcohol. The crystals, at first transparent, within thirty-six hours change into octahedra, and become opaque and yellow. It is important to note this fact when using vulcanized india-rubber corks in the presence of alcohol.

Preparation of Sulphuric Anhydride from Chamber Acid. A. B. Nobel and G. Fehrenbach. (*Dingl. polyt. Journ.*, cclvi. 316.) The authors obtain sulphuric anhydride by heating sulphuric acid (monohydrate or English sulphuric acid) with anhydrous or concentrated phosphoric acid. For this purpose a vessel made of platinum, glass, or other suitable substance, is charged with glacial phosphoric acid, and heated on a sand-bath at 320° . Sulphuric acid in the form of vapour is then passed through the vessel, the result being the production of vapours of sulphuric anhydride, which are condensed and collected in the usual manner. The phosphoric acid is concentrated by redistillation, and used for a fresh operation.

Purification of Sulphuric Acid. M. Kupferschläger. (*Bull. de la Soc. Chim.*, xlv. 353-355.) The acid is diluted with its own weight of water, treated with excess of washed sulphurous anhydride, and subsequently the acid is saturated with sulphuretted

hydrogen; the sulphides of lead and arsenic are allowed to settle, and the clear acid poured off and distilled.

The Percentage of Sulphurous Acid in Aqueous Solutions of Various Specific Gravities. W. B. Giles and A. Shearer. (*Pharm. Journ.*, 3rd series, xvi. 210-212.)

Table I.—*Experimental Determination of Percentage of SO_2 in Solutions of various Specific Gravities.*

Observed Specific Gravity.	Temperature.	Observed Percentage of SO_2 .
1.0051	15.5° C.	0.99
1.0102	„	2.05
1.0148	„	2.87
1.0204	„	4.04
1.0252	„	4.99
1.0297	„	5.89
1.0353	„	7.01
1.0399	„	8.08
1.0438	„	8.68
1.0492	„	9.80
1.0541	„	10.75
*1.0597	12.5	11.65
*1.0668	11.0	13.09

Table II.—*Calculated Specific Gravities compared with Observed Specific Gravities. (The Calculated Specific Gravities obtained by multiplying the Observed Percentages of SO_2 by 5.)*

Observed Percent- age of SO_2 .	Calculated Specific Gravity.	Observed Specific Gravity.
0.99	1.00495	1.0051
2.05	1.01025	1.0102
2.87	1.01435	1.0148
4.04	1.02020	1.0204
4.99	1.02495	1.0252
5.89	1.02945	1.0297
7.01	1.03505	1.0353
8.08	1.04040	1.0399
8.68	1.04340	1.0438
9.80	1.04900	1.0492
10.75	1.053750	1.0541
*11.65	1.058250	1.0597
*13.09	1.06545	1.0668

* It will be observed that these results are not *strictly* speaking comparable at all with the others, the temperatures at which such solutions exist preventing the observations from being made under standard conditions; in such cases a deviation from the law must be inevitable.

Table III.—*Calculated Percentage of S O₂ compared with Observed Percentage. (The Percentage calculated by dividing by 5 the units of Observed Gravity, above 1,000.)*

Observed Gravity.	Calculated Percentage.	Observed Percentage.
1·0051	1·02	0·99
1·0102	2·04	2·05
1·0148	2·96	2·87
1·0204	4·08	4·04
1·0252	5·04	4·99
1·0297	5·94	5·89
1·0353	7·06	7·01
1·0399	7·98	8·08
1·0438	8·76	8·68
1·0492	9·84	9·80
1·0541	10·82	10·75
*1·0597	11·94	11·65
*1·0668	13·36	13·09

Table IV.—*Tables given by previous Observers.*

ANTHON.		GAUTHIER AND WAGNER.	
S O ₂ .	Density.	Density.	S O ₂ .
0·95	1·005	1·0028	·5
1·90	1·009	1·0056	1·0
2·86	1·013	1·0113	2·0
3·82	1·016	1·0221	4·0
4·77	1·020	1·0275	5·0
5·72	1·023	1·0328	6·0
6·68	1·027	1·0397	7·0
7·63	1·031	1·0426	8·0
8·59	1·036	1·0474	9·0
9·54	1·046	1·0520	10·0

H. SCHIFF (*Ann. Ch. u. Pharm.* cvii. 311, 312.)

Density.	Percentage of S O ₂ .	Density.	Percentage of S O ₂ .
1·0024	1	1·0343	12
1·0049	2	1·0376	13
1·0075	3	1·0410	14
1·0102	4	1·0445	15
1·0130	5	1·0480	16
1·0158	6	1·0517	17
1·0187	7	1·0553	18
1·0217	8	1·0591	19
1·0247	9	1·0629	20
1·0278	10	1·0667	21
1·0311	11		

* See note on previous page.

Solubility of Nitric Oxide in Sulphuric Acid. G. Lunge. (*Ber. der deutsch. chem. Ges.*, xviii. 1391–1394, and *Journ. Soc. Chem. Ind.*, 1885, 447. From *Journ. Chem. Soc.*) Allen has pointed out that in working with the author's nitrometer, a layer of froth is frequently formed at the contact of the mercury and acid, and also at the surface of the acid itself. These layers of froth may be avoided in the first case by allowing the liquids full time to cool to the temperature of the air before measuring, and in the second by carefully greasing the stopcock and the mouth of the tube with the least possible quantity of vaseline.

Allen also states that a considerable error is introduced by the solubility of nitric oxide in concentrated sulphuric acid, and he advises that the loss in this way should be estimated after measuring the gas by diluting the sulphuric acid with one-half its bulk of water, when the nitric oxide is given off, and may be measured. This, however, is not the case, as is shown by the following experiments:—

First: sulphuric acid, sp. gr. 1.84, which had been saturated with nitric oxide at 18° C. and 760 mm. pressure, was titrated with a standard solution of potassium permanganate, the acid solution of nitric oxide being carefully preserved from any contact with the air. 1 c.c. of this acid was found to contain 0.035 c.c. of nitric oxide. A second experiment was made in the same way, with an acid of 1.50 sp. gr., made by diluting the strong acid with an equal bulk of water; it was found that 1 c.c. contained 0.017 c.c. of nitric oxide. Therefore, by diluting an acid of 1.84 sp. gr., saturated with nitric oxide with an equal volume of water, only 0.001 c.c. of nitric oxide will be given off. From this it is clear that the correction for the absorption of nitric oxide in the sulphuric acid cannot be made by diluting the acid; and in fact the whole error introduced by this absorption is so small, that for all ordinary experiments it may be safely neglected.

The Electrolysis of Aqueous Solutions of Sulphuric Acid, with Special Reference to the forms of Oxygen obtained. H. McLeod. (Abstract of a paper read before the Chemical Society, June 17, 1886. From the *Society's Proceedings*.) The experiments were instituted to determine the quantity of ozone that can be obtained by electrolysis. The negative electrode consisted of a small platinum plate, and the positive of a tube containing mercury, and with fine platinum wires, of 0.045 mm. and 0.027 mm. in diameter, fused into the glass. Several wires were used, the total length being about 6 mm. The electrolysis was carried out in a U-tube

surrounded by ice and water; the hydrogen was collected over water, and the ozonized oxygen passed through a tube containing a solution of potassium iodide, the oxygen being afterwards collected. The quantity of ozone was determined by acidifying the potassium iodide solution and decolorizing by a standard solution of sodium thiosulphate. In the electrolyzed acid an oxidizing substance is present which is not hydroxyl, but is probably Berthelot's persulphuric acid. The amount of this "active oxygen" was found by adding potassium iodide to the liquid, and decolorizing by the solution of thiosulphate. The electric current was measured by a tangent galvanometer, and the dimensions of the wires of the positive pole were determined. From these data the intensity of the current was calculated. Acids were used of relative densities varying between 1.025 and 1.7. The maximum quantity of ozone was obtained with solutions about 1.075, or 1.1 in density, the electrolytic oxygen containing about 16 or 17 per cent. of its weight of ozone. The maximum quantity of "active oxygen" in the oxidizing substance referred to was produced with acids about 1.2 to 1.25 in density, the proportion being 16 or 17 atoms to 100 atoms of hydrogen.

The solubility of ozone was determined by one experiment, and found to be much greater than that of oxygen.

A note is added to the paper detailing some experiments on the action of oxygen on hydrochloric acid under the influence of light: it was found that a considerable quantity of chlorine was liberated.

Hypophosphoric Acid. A. Joly. (*Journ. Chem. Soc.*, from *Comptes Rendus*, ci. 1058-1061, and 1148-1151.) Phosphorus partly immersed in water is allowed to oxidize slowly in a confined space of air at the ordinary temperature, the acid liquid heated to boiling, mixed with sodium carbonate until neutral to methyl-orange, concentrated, and allowed to cool. The salt which separates is washed with cold water, and recrystallized from boiling water, when it forms large crystals identical with those of sodium hypophosphate, $\text{Na}_2\text{H}_2\text{P}_2\text{O}_6 + 6\text{H}_2\text{O}$, described by Salzer. It loses $6\text{H}_2\text{O}$ at 110° , and at a red heat is converted into sodium metaphosphate, with evolution of hydrogen. Its solution gives with silver nitrate a white precipitate, which dissolves in warm dilute acid, from which $\text{Ag}_4\text{P}_2\text{O}_6$ crystallizes on cooling.

Hypophosphoric acid resembles phosphoric and phosphorous acids in its behaviour towards methyl-orange and phenolphthalein, but differs from them in that it shows an intermediate state of saturation corresponding with the formation of a sesquisalt.

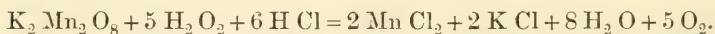
When a solution of monosodium hypophosphate is mixed with a solution of an equivalent quantity of barium chloride, a gelatinous precipitate is formed, and the solution, which was previously neutral to *Orange* No. 3, becomes acid to this indicator. Titration with standard alkali shows that half an equivalent of acid is liberated, and the precipitate is therefore dibarium hypophosphate. If the precipitate is left in contact with the liquid, it is gradually converted into crystals of monobarium hypophosphate; the conversion being accelerated by agitation and by heating to 50° or 60° . If the original solutions are mixed at 100° , the gelatinous precipitate almost immediately changes into a granular precipitate of the same composition, which is only very slowly attacked by the liberated acid. Monobarium hypophosphate is almost insoluble in water. It loses $2\text{H}_2\text{O}$ (10.8 per cent.) at 140° , and at a somewhat higher temperature gives off hydrogen, which burns with a green flame. This salt can also be obtained in the following manner: A portion of the aqueous solution of the products of the slow combustion of phosphorus is titrated, and the remainder is heated to boiling and mixed with sufficient barium carbonate to neutralize one-fourth of the total acid. When the liquid is allowed to cool, monobarium hypophosphate crystallizes out, and is purified by washing with cold water until the washings no longer reduce silver nitrate, and is then recrystallized from very dilute boiling nitric acid.

In order to prepare the acid, the monobarium salt is mixed with an equivalent quantity of sulphuric acid diluted with its own weight of water. After standing for two or three days the solution is evaporated in a vacuum over some hygroscopic substance, and when the composition of the liquid approaches $\text{P}_2\text{O}_4, 6\text{H}_2\text{O}$, it deposits bulky rectangular tables, which probably belong to the rhombic system. These crystals have the composition $\text{P}_2\text{O}_4, 4\text{H}_2\text{O}$, are deliquescent, and dissolve rapidly in a small quantity of water. With silver nitrate the solution gives a white precipitate, which does not blacken on boiling, and is soluble in warm dilute nitric acid (1 : 1).

The Presence of a Reducing Agent, probably Hydrogen Peroxide, in Natural Water. W. Ramsay. (Abstract of a paper read before the Chemical Society, June 17, 1886. From the *Society's Proceedings*.) Distilled water, as well as ordinary tap water, has a reducing action on potassium permanganate. The amount of the reducing agent is increased by evaporation, even when all possibility of contamination with solid organic impurity is excluded.

The amount of reduction is far too much to be ascribed to the nitrites present in the water. The experiments described in the paper show under what circumstances and to what extent this substance—which is probably hydrogen dioxide—is produced. If this supposition be correct, and the active substance in natural water be really hydrogen peroxide, it becomes of importance to ascertain its action on organic impurities contained in many natural waters. Experiments were therefore made quantitatively on the action of dilute solutions of peroxide of hydrogen on urea, and it was found that the urea is slowly oxidized on standing; the rate of this action has also been measured.

Action of Potassium Permanganate and of Manganese Dioxide on Hydrogen Peroxide. M. Martinon. (*Bull. de la Soc. Chim.*, xliii. 355–359.) When a solution of potassium permanganate is added to an acid solution of hydrogen peroxide, the following reaction takes place,—



If, however, the acid solution of hydrogen peroxide be titrated into the permanganate, a different reaction takes place, a precipitate of hydrated manganese dioxide being formed, according to the equation,—



This reaction varies in its character with the rate of addition of the hydrogen peroxide. On adding a neutral or alkaline solution of hydrogen peroxide to potassium permanganate, the following reaction takes place,—



If the solution of permanganate is very dilute and very alkaline, a small quantity of manganate is momentarily formed on the slow addition of the hydrogen peroxide.

If manganese dioxide is treated with hydrogen peroxide in neutral or alkaline solution, only half the quantity of oxygen is given off that would be obtained in a strongly acid solution. In estimating hydrogen peroxide by the author's method, it is generally preferable to employ an acidified solution, as the quantity of oxygen then evolved is double that disengaged when an alkaline solution is employed. The manganese dioxide must be free from carbonates.

The Decomposition of Potassium Chlorate by Heat. F. L. Teed. (Abstract of papers read before the Chemical Society, November 5, 1885, and January 21, 1886. From the *Society's Proceedings*.) By heating potassium chlorate till it had lost varying amounts of oxygen, determining that oxygen from the loss in weight, and determining the potassium chloride by means of a decinormal silver nitrate solution, with potassium chromate as indicator, the author has come to the conclusion that potassium chlorate decomposes according to the equation, $10 \text{ K Cl O}_3 = 6 \text{ K Cl O}_4 + 4 \text{ K Cl} + 3 \text{ O}_2$.

The equation indicates that for every 74.5 parts of potassium chloride produced there should be 24 parts of oxygen evolved: also, that when potassium chlorate has yielded 7.84 per cent. of oxygen, all the chlorate is decomposed, and nothing but perchlorate and chloride left.

The equation, $2 \text{ K Cl O}_3 = \text{K Cl O}_4 + \text{K Cl} + \text{O}_2$, by which the decomposition is ordinarily expressed, requires 32 parts of oxygen to every 74.5 of potassium chloride, and would not be complete till 13.06 per cent. of oxygen had been evolved.

The following are results obtained:—

Amount of K Cl O ₃ taken. Grams.	Oxygen lost, per cent.	Potassium Chloride formed, per cent.	Amount of Oxygen to 74.5 of K Cl.
3.2515	1.66	5.26	23.51
1.592	3.49	10.86	23.94
2.1725	6.00	18.25	24.49
3.956	10.52	27.36	28.65

The last experiment, in which 10.52 per cent. of oxygen was evolved, shows a much larger yield of oxygen to the 74.5 parts of potassium chloride, which is readily explainable by reference to the equation proposed. As mentioned above, the change represented by the equation is finished when 7.84 per cent. of oxygen is evolved, and 24.34 per cent. of potassium chloride is produced.

The remaining 2.68 per cent. of oxygen can only be produced by the decomposition of potassium perchlorate in accordance with the equation $\text{K Cl O}_4 = \text{K Cl} + 2 \text{ O}_2$; from this it follows that 74.5 parts of potassium chloride are produced for every 64 of oxygen, and hence that the evolution of 2.68 of oxygen should be accompanied by the formation of 3.14 of potassium chloride. Therefore, 10.52 of oxygen requires $24.34 + 3.14 = 27.48$ of potassium chloride, a number agreeing fairly well with that found—27.36.

On treating some of the residue from the fourth experiment with sulphuric acid, only the faintest possible indication of a chlorate was obtained.

The author confirms the statement that no perchlorate is formed when potassium chlorate is heated with manganese dioxide, having found in one experiment—the only one made—a ratio of 74.5 of potassium chloride to 47.15 of oxygen (theory requiring 48), when the amount of oxygen evolved was only 3.38 per cent.

If potassium perchlorate be required in quantity, it would be considerably better to heat the chlorate till only 7.84 per cent., instead of 13 per cent., of oxygen are evolved, as the equation, $2 \text{KClO}_3 = \text{KClO}_4 + \text{KCl} + \text{O}_2$, indicates a yield of 56.53 per cent. of perchlorate; the equation, $10 \text{KClO}_3 = 6 \text{KClO}_4 + 4 \text{KCl} + 3 \text{O}_2$, a yield of 67.84 per cent.

In the second paper on the same subject the author states that he has continued his experiments, and finds that when the salt is very gently heated, the decomposition more nearly approximates to that indicated by the equation $22 \text{KClO}_3 = 14 \text{KClO}_4 + 8 \text{KCl} + 5 \text{O}_2$, the majority of his results falling within the limits calculated from these two equations.

As bearing on the subject, the decomposition of potassium perchlorate by heat was investigated. It appears that in the earlier stages potassium chlorate is formed, but this disappears again long before the complete decomposition of the perchlorate is effected.

The author finds that when the perchlorate is heated with manganese dioxide, it decomposes apparently without any chlorate being formed.

Some numbers obtained by Baudrimont, which had an apparent similarity to his own, are criticised, and it is pointed out that Baudrimont's methods of analysis must have been untrustworthy.

The author intends continuing his experiments.

Arsenic in Potassium Chlorate. L. Garnier. (*Journ. de Pharm.* [5], xi. 9.) The author reports that recently potassium chlorate, intended to be used in Fresenius and Babo's method of arsenic estimation in organic matter, was found to contain decided traces of arsenic. The presence of the metal is ascribed to impurity in the chlorine employed in manufacturing the salt.

The Presence of Potassium Nitrite in the Potassium Hydrate of Commerce. Prof. W. Dunstan. (*Pharm. Journ.*, 3rd series, xvi. 778.) Attention is called by the author to the occurrence of potassium nitrite in commercial samples of the hydrate, in quantities varying from 0.3 to 1.0 per cent. This impurity is readily

detected by a careful application of the well-known iodide test. Since potassium nitrite is insoluble in alcohol, the potassium hydrate which is purified by solution in alcohol and known in commerce as "potash by alcohol," is free from this impurity.

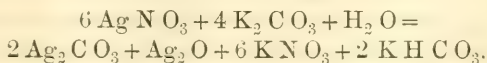
Action of Ammonia on Solutions of Potassium Salts. H. Giraud. (*Bull. de la Soc. Chim.*, xliii. 552-556.) On saturating a concentrated solution of potassium carbonate with ammonia gas, the liquid separates into two layers, the upper one containing almost all the ammonia, whilst the lower contains the potassium carbonate.

On passing ammonia through a solution of potassium sulphate, the salt is thrown down as a crystalline precipitate, the separation being almost complete when the solution contains 30 per cent. of ammonia.

On the addition of a saturated ammoniacal solution of sodium sulphate to an ammoniacal solution of a potassium salt, a crystalline precipitate of potassium sulphate is thrown down; the reaction is more delicate than the sodium tartrate test. Phosphoric acid must, however, be absent, as a precipitate of ammonium phosphate is formed under similar conditions. The reaction is not sufficiently delicate to permit either the titration or gravimetric estimation of potassium compounds.

Action of Silver Nitrate on Pure Potassium Carbonate. E. Bohlig. (*Archiv der Pharm.* [3], xxiii. 381-384.) On mixing solutions of silver nitrate and potassium carbonate, the silver precipitate can be obtained at will, either as a black, yellow, or pure white deposit, according to the state of concentration of the solution, and as one or the other is added in excess.

A solution of pure potassium carbonate, free from hydrogen potassium carbonate, was precipitated with half the amount of silver nitrate required for complete precipitation; the dark precipitate, kept from the light, was filtered off, and the filtrate was examined as to the state of the remaining potassium carbonate. A portion was titrated with decinormal oxalic acid, and another portion with standard lime water and decinormal oxalic acid; the results showed the presence of potassium sesquicarbonate. The filtrate gave a white precipitate with a silver salt, both before and after adding excess. The reaction with the monocarbonate is evidently as follows:—



Hence, as may be expected, the precipitated pure white silver carbonate in contact with excess of pure monocarbonate solution becomes blackened. A very sensitive test for the presence of bicarbonate is thus obtained. If the solution of carbonate gives a white precipitate with a little silver nitrate, bicarbonate is present. This is confirmed by similarly treating another portion of the carbonate which has been previously ignited; in this case a dark-coloured precipitate is produced.

Action of Acetic Acid on Sodium Hyposulphite. E. Mathien-Plessy. (*Comptes Rendus*, ci. 59.) When a cold saturated solution of sodium hyposulphite is mixed with half its volume of acetic acid of 8° , only 1.5 per cent. of sulphur is precipitated, even after three or four days at $20-25^{\circ}$. This solution contains hyposulphurous and acetic acids in the proportion of 1 mol. to 2 mols. It yields much finer crystals than those formed from an aqueous solution of equal strength. It acts very energetically on magnesium, with development of heat and evolution of hydrogen and sulphuretted hydrogen, but without any greater precipitation of sulphur than would take place in the cold. It would seem that alkaline hyposulphites in presence of acetic acid have a stability sufficient to render them analogous to the corresponding sulphates.

Solubility of Calcium Hydrate. (*Amer. Journ. of Pharm., from Pharmaceut. Centralhalle.*) Ordinary quicklime contains caustic alkali, which necessitates the throwing away of the first portion in making lime-water. The solubility of calcium hydrate is influenced by the length of time it remains in contact with the water. For instance, 100 cubic centimetres of lime-water, made from calcined marble in two minutes, required for saturation 9.80 c.c. of normal hydrochloric acid—equivalent to 1.372 gram of $\text{Ca}(\text{H O})_2$ in 1 litre, showing the solubility to be 1 : 728; the same quantity of lime-water which had remained in contact with the lime for six hours required 9.30 c.c. of normal hydrochloric acid—equivalent to 1.302 gram of $\text{Ca}(\text{H O})_2$ in 1 litre, showing the solubility to be 1 : 768. 100 c.c. of lime-water which had been in contact three days required 8.92 c.c. of normal hydrochloric acid for saturation—equivalent to 1.249 gram of $\text{Ca}(\text{H O})_2$ in 1 litre, showing the solubility to 1 : 800. Temperature is known to affect the solubility very much, boiling water dissolving but half as much $\text{Ca}(\text{H O})_2$ as water at the freezing-point. The quantity of water used to slake the lime also affects the solubility. One hundred parts of Ca O require 32 parts of water to form $\text{Ca}(\text{H O})_2$. If 100 parts of lime are slaked with 50 parts of water, the lime

just takes up enough water to form the hydrate, excess of water is lost by evaporation. Calcium hydrate thus formed is the most soluble, and when shaken up with water quickly precipitates, yielding a perfectly clear filtrate when thrown on a dry filter. By dissolving the lime the author noticed that oxide of calcium forms supersaturated solutions: 1 litre, at a temperature near $0^{\circ}\text{C}.$, contained 2.4 grams of CaO ; at $12^{\circ}\text{C}.$, 1.8 gram of CaO .

Solubility of Calcium Sulphate in Saline Solutions. W. A. Tilden and W. A. Shenstone. (*Proc. Royal Soc.*, xxxviii. 331-336.) Although it is generally known that the solubility of calcium sulphate in water attains a maximum at 35° , and is increased by the presence of sodium chloride, yet accurate experiments on these points are still wanting.

In this paper an account is given of determinations of the solubility of calcium sulphate in water, or in solutions of other salts at various temperatures, ranging from 8° to 200° . The results show that the solubility of calcium sulphate is increased by the presence of ammonium or sodium chloride, as a probable result of double decomposition, but is diminished by calcium chloride. In each case the form of the curve, representing solubility in terms of temperature, is nearly the same, the solubility being greatly diminished above 100° . On studying the influence of magnesium chloride, it was found that this salt is decomposed and precipitated by the water with rise of temperature, but the solvent action of the hydrochloric acid thus liberated is counteracted by the magnesium chloride remaining in solution, whose action is probably analogous to that of calcium chloride.

Solubility of Barium Sulphate in Hydrobromic and Hydriodic Acids. A. R. Haslam. (*Chemical News*, liii. 87.) The author's experiments show that barium sulphate is soluble in aqueous hydrobromic acid to the extent of 1 in 2,500, and in aqueous hydriodic acid to the extent of 1 in 6,000.

Insolubility of Barium Chloride in Presence of Lithium Chloride. C. N. Draper. (*Chemical News*, liii. 52.) The author finds that barium chloride is so insoluble in a solution of lithium chloride, that upon mixing solutions of the two salts a crystalline precipitate was formed, which upon examination proved to consist of barium chloride only.

Mercurous Iodide. G. A. Haffa. (*Amer. Journ. Pharm.*, 1886, 12.) According to the author this compound is best made by precipitation of mercurous nitrate with potassium iodide, and may then be obtained of a yellow or green colour, according to the

density of the solution. The solution of mercurous nitrate is prepared by acting upon 15,000 grs. of mercury with a cold mixture of nitric acid (6,000 grs.) and water (4,000 grs.) placing the vessel in cold water and stirring the contents constantly until the reaction has entirely ceased; the white crystalline mass, without being separated from the excess of metallic mercury, is then dissolved in water acidulated with nitric acid (1 oz. to the gallon) until the solution measures four pints.

For preparing *green* mercurous iodide, mix the solution of mercurous nitrate (6 oz.) with water (6 pints), and add to it in a continuous stream, and with constant stirring, a solution of potassium iodide (3 oz.) in water (54 oz.), decant, wash the precipitate with water, and dry without the aid of heat.

For preparing *yellow* mercurous iodide, operate in the same manner, but use solution of mercurous nitrate (2 oz.) diluted with water (8 pints), and a solution of potassium iodide (1 oz.) in water (4 pints). This salt darkens much more quickly when exposed to the light than that made by the pharmacopœial process.

The Solubility of Mercuric Iodide in Fatty Bodies and some other Solvents. C. Méhu. (*Journ. de Pharm.* [5], xi. 249-255.) The author reports upon the solvent action on mercuric iodide of oil of almonds, olive oil, poppy-seed oil, nut oil, castor oil, lard, vaseline, carbolic acid, and benzol. For particulars reference should be made to the above source, as the results recorded are not suited for useful condensation.

Formation of Red Silver Solutions by Reduction. O. v. Pfordten. (*Ber. der deutsch. chem. Ges.*, xviii. 1407, 1408.) A concentrated solution of silver nitrate, when treated with phosphorous acid, assumes a red colour, which becomes more and more intense until the separation of a black powder (silver or argentous oxide) occurs. The red colour is also produced when a solution of silver nitrate and nitric acid is treated with sulphurous anhydride.

Compounds of Silver Nitrate with Alkaline Nitrates. A. Ditte. (*Comptes Rendus*, November 2, 1885.) When a mixed solution of silver and potassium nitrates is evaporated, a compound is obtained composed of equal mols. of the two nitrates. With rubidium, and probably with cæsium nitrates, analogous compounds are obtained. The same is the case with ammonium nitrate. With sodium and lithium nitrates double salts of a definite composition are not obtained.

Action of Light on Silver Chloride. S. B. Newbury. (*Amer. Chem. Soc.*, vi. 407-411; *Journ. Chem. Soc.*, 1885, 956.) The

author worked as follows:—In each experiment the quantity of silver nitrate necessary to produce 0·1 gram of silver chloride was dissolved in 100 c. c. of water, and a very minute excess of sodium chloride, dissolved in the same quantity of water, added. The finely suspended precipitate was exposed to light for varying periods, a current of air being continually drawn through the liquid to hinder subsidence and carry off any chlorine liberated. The precipitate was then collected on a Gooch filter, and dried at 140°. Blank experiments (where light was excluded) yielded 0·0996–0·0997 gram of silver chloride. After weighing, the exposed precipitate was treated with hot ammonia and the residual silver weighed. Four experiments, where the exposure was continued for several days, gave—

	Weight of Precipitate.	Loss beyond experimental error.	Metallic Silver.	Metallic Silver calculated from Loss.
1	0·0967	0·0029	0·0054	0·0085
2	0·0979	0·0018	0·0076	0·0054
3	0·0969	0·0027	0·0078	0·0081
4	0·0982	0·0015	0·0062	0 0045

When small quantities of stannous chloride are added to the mixture, before exposure to light, blackening takes place more rapidly and subsidence is much slower and less complete. The grey precipitate obtained consisted almost wholly of finely-divided silver.

All attempts to isolate a sub-chloride from the blackened silver chloride precipitate proved unavailing. Ammonia, sodium thio-sulphate, potassium cyanide, and sodium chloride were employed as solvents for the silver chloride, but in each case metallic silver only was left.

The author also endeavoured to prepare silver sub-chloride by Von Bibra's method of reducing silver citrate in hydrogen, and treating the residue with hydrochloric acid; but the resultant compound, when treated with a dilute solution of sodium chloride, only yielded metallic silver.

The author considers that these results support the view of the non-existence of the sub-chloride, as otherwise it must be assumed that this sub-chloride is decomposed into silver and silver chloride by the action of a cold dilute solution of sodium chloride, which is highly improbable.

Lead Tetrachloride. T. Nikolukine. (*Journ. Russ. Chem. Soc.*, 1885, 207-210; *Journ. Chem. Soc.*, 1886, 123.) The author finds that by the action of hydrochloric acid on lead peroxide, the reaction being conducted at a low temperature, lead tetrachloride is formed, together with the dichloride. Potassium chloride forms with the tetrachloride a double salt, similar to that with stannic chloride, soluble in a saturated solution of potassium chloride, lead dichloride being very sparingly soluble therein. With ammonium chloride the reverse is the case: its double salt with lead tetrachloride being insoluble, and lead dichloride soluble, in the saturated solution. Lead tetrachloride is a strong oxidizing agent, acting even on platinum; its solutions evolve chlorine after a time, and deposit crystals of the dichloride; when heated, chlorine is rapidly evolved. With caustic alkalis and their carbonates, a dark brown precipitate of lead peroxide is formed. In the action of hydrochloric acid on lead peroxide, a double compound of the acid with the tetrachloride is most probably formed. Lead tetrachloride is decomposed by small quantities of water with evolution of chlorine; with large quantities of water a red-brown coloration of the liquid occurs, apparently due to the formation of lead peroxide.

Dry Distillation of Wood. M. Senff. (*Moniteur Scientifique*, xv. July, 1885.) It appears from the author's experiments that the yield of crude pyroligneous acid, tar, charcoal, and gas is almost the same with the most different woods. But the richness of the acid waters in acetic acid, and consequently the yield of dehydrated acid, vary greatly. In this respect the wood of coniferous trees is the least valuable. The wood of the trunk furnishes more acid than that of the branches. The wood yields more acid than the bark, and sound wood more than dead wood. Rapid calcination yields more gas at the expense of the condensed products and of the charcoal; it yields also the weakest acid waters, and the charcoal is more hygroscopic than that furnished by a gradual action.

Impurities in Methyl Alcohol. F. Schlagdenhauffen. (*Journ. de Pharm. et de Chim.* [5], xii. No. 2, July 15, 1885.) A sample of methyl alcohol examined by the author proved to contain lead oleate and stearate. He considers that it must have been used in place of ether for the separation of lead stearates and oleates, and afterwards carelessly rectified.

Compound of Methyl Alcohol and Copper Sulphate. M. de Forcrand. (*Comptes Rendus*, March 8, 1886.) If pure anhy-

drous methylic alcohol is allowed to react in the cold upon anhydrous copper sulphate, a green colour quickly appears, either in the mass of copper sulphate or in the liquid. This colour is due to a compound of the two bodies, slightly soluble in an excess of methylic alcohol. The higher homologues of methylic alcohol do not form similar combinations.

Absolute Alcohol. Dr. E. R. Squibb. (*Pharm. Journ.*, 3rd series, xvi. 147, 148.) The author's experiments show that, with the means and under the management fully described in his paper, a specific gravity of $\cdot 79350$ at $15\cdot 6^{\circ}\text{C}$., compared with water at $15\cdot 6^{\circ}\text{C}$., uncorrected for brass weights used, is the lowest obtainable point for ethyl alcohol; and that $\cdot 7940$ is so easily obtained in practice on the large scale, that in commerce "absolute alcohol" should not be accepted as such when above this specific gravity, when fresh parcels of it are first opened and weighed without much exposure to air.

Iodaldehyde. P. Chautard. (*Pharm. Journ.*, 3rd series, xvi. 924; from *Comptes Rendus*.) 50 grams of iodine, 20 grams of crystallized iodic acid, and 150 c.c. of a 30 per cent. aqueous solution of aldehyde, are mixed and allowed to remain in a closed flask until the iodine is completely dissolved. About 500 c.c. of water is then added, and the iodaldehyde separates in a heavy, oily layer. The reaction is complete in three or four days at the ordinary temperature, or in a few hours if the mixture is gently heated. If pure aldehyde is used, there is a considerable development of heat, and resinous products, which probably contain polymerides, are formed.

The crude product is dissolved in ether, agitated with pure mercury to remove excess of iodine, and dried in a vacuum over sulphuric acid.

Iodaldehyde is a colourless, limpid, oily liquid, which blackens rapidly when exposed to light, and does not solidify at -20° ; sp. gr. at $20^{\circ} = 2\cdot 14$. It is non-inflammable and volatile, but decomposes at 80° , and cannot be distilled without decomposition, even under a pressure of 20 mm. The solutions may, however, be heated to a high temperature without undergoing alteration. Iodaldehyde is soluble in all proportions in alcohol, ether, benzene, chloroform, and carbon bisulphide. It is also soluble to a certain extent in cold water, by which it is not decomposed.

Potash and soda rapidly convert iodaldehyde into iodoform. Sodium hydrogen sulphite combines with it with development of heat, forming a crystalline compound. Aqueous ammonia at the

ordinary temperature produces different oxaldines, according to the relative proportions, oxytrialdine and oxyptaldine being the most easily obtained. The latter is also easily prepared by the action of iodine and iodic acid on aldehyde-ammonia at the ordinary temperature. The action of dry ammonia gas on an alcoholic or ethereal solution of iodalddehyde has not yet been fully investigated.

Iodaldehyde is instantly decomposed by dilute acids. Chlorine and bromine displace the iodine, forming chloro- or bromo derivatives. Nascent hydrogen reconverts it into aldehyde. Aniline, toluidine, and other compound ammonias readily unite with it.

If dry powdered potassium cyanide is added to a solution of iodaldehyde in absolute ether, heat is developed, potassium iodide is precipitated, and cyanaldehyde, $\text{CN} \cdot \text{CH}_2 \cdot \text{COH}$, is formed. This is a colourless, somewhat oily liquid, with a strong odour of nuts. It boils at about 100° , and its vapours produce violent headache.

Detection of Chloral Hydrate. MM. Vitali and Tornani. (*Archiv der Pharm.* [3], xxiii. 234, 235.) The method admits of the detection of chloral in the presence of chloroform, and conversely. The suspected matter is mixed with water when necessary, strongly acidified with tartaric acid, and distilled to dryness in a gentle current of carbonic anhydride, the receiver being well cooled by means of ice. Experiment shows that both chloroform and chloral pass over completely. The distillate is again acidified with tartaric acid, and a gentle current of hydrogen is passed through in a special apparatus. All the chloroform is thus carried off, whilst only traces of chloral volatilize; the latter is arrested by an interposed column of sulphuric acid. The escaping steam of hydrogen is burnt at a platinum jet, and on bringing a piece of brass gauze into the flame a beautiful blue copper chloride flame is produced if chloroform is present in the gas, and the products of combustion when drawn through an ammonia solution give an azure-blue colour. On acidifying this solution with nitric acid, the chlorine can be precipitated, and the amount of chloroform then deduced. When all the chloroform is expelled, the distillate is treated with excess of potash, and the gas is again passed through. All the chloroform now obtained can only be from the decomposition of the chloral hydrate. It may be added that the qualitative detection of chloroform in the hydrogen current can also be obtained by passing the gas into a

solution of thymol in potash, which gives an intense violet colour with chloroform.

Action of Potassium Chlorate on Chloral Hydrate. K. Seubert. (*Ber. der deutsch. chem. Ges.*, xviii. 3336-3339; *Pharm. Journ.*, 3rd series, xvi. 902.) When 165 grams of chloral hydrate and 37.43 grams of potassium chlorate are finely powdered and exposed to direct sunlight in a flask fitted with a reflux condenser, a reaction soon begins with great rise of temperature, and the flask must be cooled by immersion in cold water. Chlorine, phosgene gas, carbonic anhydride, and chloroform are given off. In four days the reaction is complete, and a separation of crystals takes place, which may be increased by surrounding the flask with ice. The whole is then filtered and washed with absolute alcohol. Water is added to the alcoholic solution, which then yields on evaporation very pure hydrogen potassium trichloracetate. A small quantity of perchlorethane is also formed in the reaction.

Action of Oxidizing Agents on Chloral Hydrate. S. Cotton. (*Bull. de la Soc. Chim.* xliii., 420-423.) The yellow variety of mercuric oxide decomposes an aqueous solution of chloral hydrate, forming carbonic anhydride, carbonic oxide, and mercuric oxychloride. Red mercuric oxide acts in the same way, but is less active than the yellow variety.

Potassium permanganate acts on chloral hydrate in two distinct stages; in the first, potassium manganate and manganese dioxide are formed, part of the chloral hydrate being completely decomposed, and carbonic anhydride, oxygen, and chlorine are disengaged; whilst in the second stage the potassium manganate reacts upon a further amount of chloral hydrate, with formation of chloroform and evolution of oxygen and carbonic anhydride.

Chromic acid acts violently on crystals of chloral hydrate, carbonic anhydride and carbonic oxide being formed; in dilute aqueous solution in the cold, it does not attack the chloral hydrate, but reaction takes place on warming.

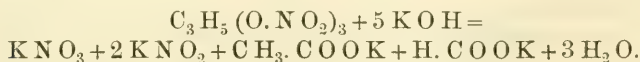
Chromic acid and potassium permanganate have practically no action on chloroform, bromoform, or iodoform; yellow mercuric oxide also appears to be quite without action on either chloroform or bromoform; it acts rapidly, however, on iodoform, carbonic oxide, containing traces of carbonic anhydride, being given off.

Action of Ammonia and Water upon Chloroform. G. André. (*Comptes Rendus*, March 8, 1886.) This action results in the formation of ammonium formate, ammonium hydrochlorate, and carbon monoxide. If the temperature employed is lower than

180°, this action is incomplete, and a portion of the chloroform remains unaltered.

Oxidation of Glycerol in Alkaline Solution. E. Börnstein. (*Ber. der deutsch. chem. Ges.*, xviii. 3357, 3358.) When mercuric oxide and barium hydroxide are added to a strong boiling aqueous solution of glycerol, as long as any action takes place, and if the product is filtered, evaporated, and the barium salt thus obtained decomposed by sulphuric acid, a solution of almost pure glyceric acid is obtained. The yield is 45 per cent. of the weight of glycerol employed.

The Chemistry of Nitroglycerol. M. Hay. (*Amer. Journ. Pharm.*, 1886, 39, 40.) From the resemblance of nitroglycerol to the nitrites in its physiological and therapeutical properties, the author was at first inclined to regard it as being a glyceryl nitrite instead of a nitrate, but the result of a further investigation did not confirm this view. Railton and others have stated that nitroglycerol when treated with alcoholic potash yields glycerol and potassium nitrate. This statement is quite incorrect; the decomposition is of a complex nature. No glycerol is obtained, as it is oxidized at the expense of the N O_3 groups, about two-thirds of which suffer reduction to the nitrous condition, only about one-third being found as nitrate at the end of the reaction. The other products of the reaction are potassium acetate, oxalate, and formate, a small amount of ammonia, and a reddish brown resinous substance which gives a dark colour to the liquid. Numerous determinations of the amount of nitrite formed showed that 100 parts of nitroglycerol gave from 34.14 to 35.24 parts of nitrous anhydride. (If two-thirds of the nitrogen were converted into nitrous anhydride, the amount would be 33.48.) As it was also found that 5 mols. of potash were required to decompose 1 mol. of nitroglycerol, it seems that the principal reaction may be expressed by the equation—



The reaction is the same either with alcoholic or aqueous potash, but is very slow in the latter case, owing to the sparing solubility of nitroglycerol in water.

Ammonia and alkaline carbonates act in a manner similar to potash. The same may be said for sodium hydrogen phosphate, but the reaction is much less powerful, whilst sodium chloride exerts hardly any action. Hydrochloric acid acts less powerfully

than alkaline carbonates, and sulphuric acid (1:10) less powerfully still; whilst the concentrated acid has no action. De Vrij's statement that nitroglycerol is decomposed by sulphuretted hydrogen, is not correct. The alkaline sulphides decompose nitroglycerol, sulphur being precipitated, and the reaction is rapid, and seems to be promoted by the sulphur; yet the particular part played by that element has not been ascertained. Hot water decomposes nitroglycerol slowly. The amount of nitroglycerol formed from a given weight of glycerol agrees fairly with the assumption of its being glyceryl trinitrate.

As different statements have been made as to the physical characters of nitroglycerol, the author has prepared it in a state of purity, and finds that it is perfectly colourless, and remains so even when exposed to air. It keeps equally well in water or alcohol. Heated on the water-bath no change occurs, unless acids or alkalies are present.

1 gram of nitroglycerol dissolves in 800 c. c. water; in 3 c. c. alcohol; in 10.5 c. c. alcohol (sp. gr. 0.846); in 1 c. c. methyl alcohol (sp. gr. 0.814); in 4 c. c. methylated spirit (sp. gr. 0.830); in 18 c. c. amyl alcohol; in less than 1 c. c. benzine; in 120 c. c. carbon bisulphide; in all proportions in ether, chloroform, glacial acetic acid, and phenol; and sparingly in glycerol.

Nitroglycerol can be estimated with tolerable accuracy by determining the amount of nitrate formed by boiling with alcoholic potash, and assuming that 100 parts of nitroglycerol yield 33.48 parts of nitrous anhydride.

Preparation of Galactose. E. Bourquelot. (*Journ. de Pharm.* [5], xiii. 51-54.) Stopped flasks of 600 c. c. capacity are charged with 100 grams of milk-sugar, 9 grams of sulphuric acid, and water to make up 600 c. c. The stoppers were wired in, and the flasks are heated at 105° in a calcium chloride bath for one hour, and then cooled. After neutralizing with barium carbonate, and filtering, the solution is evaporated until the liquid corresponding with 500 grams of milk-sugar weighs 640 grams. The syrup is set aside to crystallize, and this is completed in from four to five days if a little galactose, previously prepared, be added to it. A little alcohol at 80° is then added, and the crystals are drained. This treatment is repeated, when a very white product is obtained. From 500 grams of milk-sugar, 120 to 135 grams of galactose dried at 108° are obtained. 250 grams of the crystals are heated with 180 c. c. of boiling water and 1 litre of alcohol at 90° in a reflux apparatus for twenty minutes. All the crystals dissolve;

after filtering, the crystals soon begin to appear again, and in twenty-four hours about 150 grams are obtained. These crystals have the form of hexagonal plates. After drying at 100° , they fuse at $163\text{--}164^{\circ}$, and after repeated crystallization show a rotatory power of $[\alpha]_D = 80^{\circ} 74'$ at 19° .

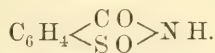
Influence of Neutral Salts and of Temperature on the Inversion of Cane-Sugar by Acids. J. Spohr. (*Journ. pract. Chem.* [2], xxxiii. 265-284; *Pharm. Journ.*, 3rd series, xvi. 1052.) In continuation of his experiments on this subject, the author finds that when the relation between the amount of acid and water present is constant, but the amount of the cane-sugar variable, different weights of the sugar are inverted in equal times. The intensity of the inverting action of hydrochloric or hydrobromic acids always increases with the amount of neutral salts added, this increase being greatest when the amount of the neutral salt present is relatively small compared with that of the acid, and least when the neutral salt is in relatively large proportion. If the amount of acid present is constant, the increase of the rate of inversion is directly proportional to the amount of the neutral salt added. The amount of the neutral salt present being constant, the intensity of the inverting action of the acid varies directly with its concentration. In the case of acids similar to hydrobromic acid, the percentage of alteration of the rapidity of the inversion caused by the addition of a neutral salt depends only on the quantity of the added salt, and is independent of the concentration of the acid. The results obtained by the author when employing hydrochloric acid are similar to those obtained with hydrobromic acid, and do not support the views adopted by Löwenthal and Lenssen. The laws according to which the intensity of the inverting action of sulphuric acid is affected by the concentration of the acid and presence of the neutral salt, are much more obscure than is the case with the monobasic acids; this is partly due to the formation of double salts; the neutral salts, however, act more markedly when the amount present is relatively small compared with the amount of acid.

Cyclamose, a New Sugar. G. Michaud. (*Chemical News*, liii. 232.) Cyclamose is found in the tubercles of *Cyclamen Europeanum*. Its formula, as deduced from its analysis, is $C_{12}H_{22}O_{11}$. This formula is confirmed by the fact that cyclamose can be inverted by diluted acids. The most striking feature in cyclamose is its rotatory power (-15.15), which is left-handed, while all the other sugars in the group $C_{12}H_{22}O_{11}$ are right-handed or inactive.

The activity of cyclamose is not affected by temperature, but it decreases under the influence of basic lead acetate. At 65° C. dilute hydrochloric acid almost immediately increases it, and makes it equal -66·54 at 15° C.; but this number rapidly decreases under the influence of heat. Like lactose, cyclamose reduces Fehling's solution.

Cyclamose is obtained by leaving for a few days tubercles of *Cyclamen* with weak alcohol (80 per cent.). The filtered solution must be concentrated, and mixed with a great excess of strong alcohol (96 per cent.), which causes the formation of a precipitate of sugar. This precipitate is dissolved in water, and mixed with slaked lime. After filtration of the solution alcohol is added to it. The voluminous precipitate which appears is collected in a filter and washed with alcohol; then it is dissolved in water, and a current of carbonic dioxide is sent through it. The filtered solution, evaporated in an air-pump vacuum over a basin containing oil of vitriol, leaves pure cyclamose.

Saccharin. (*Pharm. Journ.*, 3rd series, xvi. 837.) Saccharin is the commercial name of a coal-tar derivative, which has attracted much attention of late on account of its intense sweetness, which far exceeds that of cane-sugar. Among other purposes, it has been recommended as a sweetening material for the food of diabetic patients, and with this object pills, containing each 0·05 gram, are prepared, of which one or two suffice to sweeten a cup of coffee; it is said also to form a chemical compound with quinine (*Pharm. Centralh.*, xxvi. 604). Saccharin is the discovery of Dr. Fahlberg, of New York, and some information in respect to its chemical constitution was communicated recently by I. Levinstein to the Manchester Section of the Society of Chemical Industry (*Journal*, Feb. 27, 1886, p. 75). It appears from this that saccharin is benzoyl-sulphonic-imide, and may be represented by the formula,—



It is prepared by converting toluene, $\text{C}_6\text{H}_5(\text{CH}_3)$, into its mono-sulphonic acid, $(\text{C}_6\text{H}_4\cdot\text{CH}_3\cdot\text{SO}_2)$; transforming this into the corresponding orthotoluene-sulphonic chloride, $(\text{C}_6\text{H}_4\cdot\text{CH}_3\cdot\text{SO}_2\text{Cl})$, by treatment with phosphorus pentachloride; introducing an amido group to form orthotoluene sulphamide, $(\text{C}_6\text{H}_4\cdot\text{CH}_3\cdot\text{SO}_2\text{NH}_2)$, and this by oxidation yields benzoyl-sulphonic-imide, or saccharin. It is described as occurring as a white powder, melting at 200° C. with partial decomposition, and crystallizing from an aqueous

solution in thick short prisms, that are difficultly soluble in cold and more readily in warm water. Alcohol, ether, glucose, and glycerin are good solvents of it, and its solubility in ether might be utilized to detect its presence when mixed with sugar. Saccharin is said to form salts having a sweet taste, and to possess moderately strong antiseptic properties. It is claimed to be about 230 times as sweet as the best cane or beet sugar, to impart an intensely sweet taste to solutions as dilute as 1 part in 10,000 parts of water, and when added to glucose in the proportion of 1 in 1,000 or 2,000, to render it undistinguishable as to taste from cane-sugar.

Some physiological experiments made by Dr. Stutzer, of Bonn (*Pharm. Centralh.*, March 4, 1886, p. 107), are said to have shown that saccharin passes unaltered through the organism, and exclusively into the urine, the composition of which it does not otherwise affect. Administered to dogs in large doses for several days successively, it was not found to influence the change of tissue, and it is pronounced to be perfectly non-injurious. When introduced subcutaneously, it was rapidly absorbed, and was detected in the urine half an hour afterwards.

Derivatives of Papaverine. C. Goldschmiedt. (*Monatsh. Chem.*, vi. 372-403.) Papaverine, according to Merck, has the formula $C_{20}H_{21}NO_4$, whilst Hesse (*Liebig's Annalen*, cxliii. 75, and *Supplement*, viii. 289) attributes to it the formula $C_{21}H_{21}NO_4$. By the oxidation of this substance by an aqueous solution of potassium permanganate, the author obtained *veratric acid*, $C_9H_{10}O_4$, *hemipinic acid*, $C_{10}H_{10}O_6$, and *pyridine-tricarboxylic acid*, $C_8H_5NO_6$, oxalic acid, ammonia, and a new acid, papaveric acid, which formed the chief product.

Papaveric acid, $C_{16}H_{13}NO_7$, is a white crystalline powder, melting at 233° , at the same time decomposing with evolution of gas. It is sparingly soluble in cold and hot water, and also in such solvents as ether, alcohol, benzene, etc. It is most easily dissolved by hot dilute alcohol, glacial acetic acid, or amyl alcohol. Its aqueous solutions are strongly acid, decompose carbonates, and give precipitates with lead acetate, silver nitrate, and copper acetate.

The ammonium, potassium, calcium, barium, basic copper, and normal and acid silver salts are described.

Papaveric acid dissolves in concentrated hydrochloric acid, forming a yellow solution, from which orange needle-shaped crystals separate out, having the composition $C_{16}H_{13}NO_7 \cdot HCl + 2\frac{1}{2}H_2O$. This solution yields a second deposit of orange-red crystals, con-

sisting of the anhydrous hydrochloride. It does not form a platino-chloride.

Mononitropapaveric acid, $\text{N O}_2 \cdot \text{C}_{16} \text{H}_{13} \text{N O}_7$, is formed by dissolving the acid in concentrated nitric acid, or by heating a solution of the acid in glacial acetic acid with nitrous acid. It is easily soluble in hot water, alcohol, and glacial acetic acid, but only sparingly soluble in cold water. It crystallizes from water in slender, lustrous, yellow needles, containing 1 mol. $\text{H}_2 \text{O}$; it melts at 215° . Its *silver salt*, $\text{N O}_2 \cdot \text{C}_{16} \text{H}_{10} \text{N O}_7 \text{Ag}_2$, forms a white crystalline powder, sparingly soluble in hot water. Together with the above nitro-acid, the production of two other compounds has been observed, one crystallizing from water in yellow lustrous needles, melting at 122° , and a red substance, which is sparingly soluble in water and alcohol, melts at $245\text{--}246^\circ$, and has the formula $\text{C}_{14} \text{H}_9 \text{N O}_7$.

Pyropapaveric acid, $\text{C}_{15} \text{H}_{13} \text{N O}_5$, is formed when papaveric acid is heated at 235° . It is more easily soluble in water and alcohol than papaveric acid, but less soluble in dilute alcohol than the latter. It crystallizes in small white leaflets, melting at 230° . Its *silver salt* is obtained as a white precipitate on adding silver nitrate to the ammonium salt.

Papaveric acid when fused with potassium hydrate yields protocatechuic acid, and when heated with alcoholic potash yields a small quantity of ammonia.

Papaverine. C. Goldschmiedt. (*Monatsh. Chem.*, vii. 667-701.) Compare preceding abstract. Analyses of papaverine and of a large number of its salts, confirm the correctness of the formula, $\text{C}_{20} \text{H}_{21} \text{N O}_4$, assigned to papaverine by Merck and others. Papaverine crystallizes in rhombic prisms, $a : b : c = 0.3193 : 1 : 0.4266$. Crystallographic measurements of various derivatives and salts are also given.

Two Reactions of Morphine. J. Donath. (*Journ. für prakt. Chem.*, xxxiii., part 2.) Finely-ground morphine (about 1 mgrm.) is well rubbed up with 8 drops of sulphuric acid in a porcelain capsule; a granule of potassium arseniate is added, and stirred up together with the other materials. If the mixture is then heated over a small flame, shaking it all the time, until acid vapours begin to escape, a fine violet-blue coloration appears, which on further heating turns to a dark brownish red. On cautious dilution with water there appears a reddish coloration, which turns green on the further addition of water. If this liquid is poured into a test-tube, chloroform being added, and the whole

shaken, the latter takes a splendid violet colour. Ether likewise takes a splendid violet-red, whilst the supernatant stratum is brown. Dehydromorphine, on the other hand, on triturating with sulphuric acid and potassium arseniate, becomes a dirty green, which turns brown on heating, and intensely green on dilution with water. This solution gives up no colouring matter to chloroform. The second reaction is effected with sulphuric acid and potassium chloride, and resembles the ferric-chloride reaction.

A little morphine triturated with about 8 drops of strong sulphuric acid, turns grass-green in the cold on adding a drop of a solution of 1 part of potassium chlorate in 50 parts of concentrated sulphuric acid. The colour is very persistent, and at the margin of the liquid there appears a faint rose coloration. Dehydromorphine similarly treated becomes a brownish green.

Derivatives of Morphine and Codeine. O. Fischer and E. v. Gerichten. (*Ber. der deutsch. chem. Ges.*, xix. 792-795.) 20 grams of morphine methiodide were boiled with 200 grams of acetic anhydride until all was dissolved, and the calculated quantity of finely powdered silver acetate (about 7.5 grams) added. The whole was then boiled for four to five hours, filtered, and the filtrate heated for some hours at 180° . The greater part of the acetic anhydride was then distilled off, and the residue poured into water; this, when extracted with warm ether, yielded a *compound*, $C_{18}H_{14}O_4$. The latter forms splendid white needles, melts at 159° , is insoluble in water, acids, and alkalies, and sublimes unchanged. When oxidized, it yields a product which gives Laubenheimer's phenanthraquinone reaction. When the compound is heated with alcoholic ammonia at 100° , the two acetyl-groups are eliminated with formation of a *compound*, $C_{14}H_{10}O_2$. This separates from water (previously freed from air and kept in an atmosphere of carbonic anhydride) in almost colourless crystals melting at 143° . It is very unstable, and is readily oxidized by ferric chloride, Fehling's solution, etc. When a solution of the compound in sulphuric acid is treated with a drop of nitric acid, it acquires a red colour; morphine reacts analogously.

Codeine, when treated in the way described above, yields a *compound*, $C_{17}H_{14}O_3$. This crystallizes from alcohol in long needles, which melt at 131° ; it is sparingly soluble in water, insoluble in dilute acids and alkalies. The solution in sulphuric acid has an intense yellow colour, and when heated acquires a blue fluorescence. The substance is also formed by boiling methocodeine and ethocodeine with acetic anhydride, and is identical with the product

obtained by Hesse by heating acetylmethocodeine at 120° . When treated with alcoholic ammonia, it yields a phenol, probably the methyl salt of the compound, $C_{14}H_{10}O_2$, described above.

Morphine Lactate. D. B. Dott. (*Pharm. Journ.*, 3rd series, xvi. 958.) The author describes a crystalline lactate of morphine answering to the formula $C_{17}H_{19}NO_3 \cdot C_3H_5O_3$, and is soluble in 7.94 parts of water, and in 92.31 parts of alcohol of 85 per cent. It seems to be the only salt of morphine which crystallizes from water as an anhydrate.

New Reaction of Codeine. P. Lafon. (*Comptes Rendus*, c. 1543. 1544.) The reagent recommended by the author is a solution of one gram of ammonium selenite in 20 c.c. of strong sulphuric acid, which gives a magnificent green colour with traces of codeine, and is said to be sufficiently delicate to allow of the detection of one-tenth of a milligram of the alkaloid. The author states that none of the alkaloids or glucosides in ordinary therapeutic use gives this reaction, the only near approach to it being by morphine, which can, however, be detected by other known tests.

Derivatives of Strychnine. W. F. Loebisch and P. Schoop. (*Monatsh. für Chem.*, vi. 844-862.) The derivatives of strychnine described by the author are *nitro-strychnine*, *amido-strychnine*, *monobromstrychnine*, and *strychninesulphonic acid*. For particulars reference should be made to the original article.

The Chromate Test for Strychnine. (*Pharm. Zeitung*, 1886, 10.) Prof. Flückiger recommends the following mode of working this test: Dissolve 1 centigram of chromate of potassium in 5 c.c. of water, and add 15 grams (8.15 c.c.) of sulphuric acid of sp. gr. 1.84 at $15^{\circ}C$. Suspected solids are sprinkled with it on a porcelain plate, when, if strychnine is present, the characteristic blue coloration is produced. If the strychnine is in solution, a distinct blue zone is obtained by dropping the suspected solution into the reagent. Several substances prevent the formation of the blue colour. A mixture of equal parts of strychnine and brucine only shows the brucine (red) coloration when treated with the reagent. The strychnine test is applicable only when there is at least ten times as much strychnine as brucine present.

Strychnine Chromate. F. Ditzler. (*Archiv der Pharm.* [3], xiv. 105-109.) The author describes a *distrychnine chromate* of the formula $(C_{21}H_{22}N_2O_2)_2 \cdot CrO_4H_2$, and a *monostrychnine chromate* of the formula $(C_{21}H_{22}N_2O_2)_2 \cdot Cr_2O_7H_2$. For details reference should be made to the original article.

Action of Sulphuric Acid on Strychnine: Formation of Sulphonic Acids. C. Stoehr. (*Ber. der deutsch. chem. Ges.*, xviii., 3429-3432; *Journ. Soc. Chem. Ind.*, 1886, 174.) Crystallized strychnine, melting-point $265-266^{\circ}$, when heated with the necessary quantity of concentrated sulphuric acid at 100° , forms a monosulphonic acid, with a nearly quantitative yield. According to Loebisch and Schoop, under these conditions strychnine is not attacked. This monosulphonic acid, $C_{21}H_{21}N_2O_2.SO_3H$, is a colourless substance, very little soluble in water or alcohol. The ammonium salt is very soluble in water, from which alcohol precipitates it; the potassium, sodium, barium, calcium, lead and copper salts form very insoluble precipitates. Concentrated sulphuric acid and sulphuric anhydride at 150° form readily a disulphonic acid, the yield being also good. The free acid, $C_{21}H_{20}N_2O_2(SO_3H)_2$, is a colourless amorphous substance, soluble in water, slightly soluble in alcohol, ether, and benzene. Its normal barium salt, $C_{21}H_{20}N_2O_2.(SO_3)_2Ba$, forms colourless tables or cubes; the hydrogen barium salt—



a pale yellow amorphous powder, is obtained by adding hydrochloric acid to the solution of the normal salt.

Strychnine and Brucine. A. Hanssen. (*Ber. der deutsch. Chem. Ges.*, xviii. 1917.) The author has submitted brucine and strychnine to a similar process of oxidation with chromic and sulphuric acids. The resulting product is the same in both cases, and has the formula $C_{16}H_{18}N_2O_4$. It appears, therefore, that in the case of strychnine the group C_5H_4 , in that of brucine the group $C_7H_8O_2$, have been eliminated. The author explains this by supposing that the group C_5H_4 represents a benzene ring, joined to the group $C_{16}H_{18}N_2O_4$, as in "diphenyl." The explanation is borne out by the fact that strychnine forms nitro- and bromo-substitution products, which is not the case with the oxidation product. In the same manner the group $C_7H_8O_2$, split off by oxidation from brucine, is supposed to be a dimethoxy-benzene group, and brucine a dimethoxy-strychnine.

Derivatives of Brucine. A. Hanssen. (*Ber. der deutsch. chem. Ges.*, xix. 520-524.)

Nitrobrucine nitrate, $NO_2.C_{23}H_{25}N_2O_4.HNO_3$, is obtained by suspending brucine methiodide in absolute alcohol, heating to boiling, and adding concentrated nitric acid until the methiodide is dissolved; it crystallizes in slender, golden-yellow needles,

sparingly soluble in alcohol and ether, readily soluble in water; with reducing agents it gives a violet coloration. When heated in aqueous solution, it gives first a green, then a brown coloration. When treated with sodium sulphite and sulphuric acid, small violet rhombic plates separate, which dissolve in aqueous potash with blue coloration.

Nitrobrucine, $\text{N O}_2 \cdot \text{C}_{23} \text{H}_{25} \text{N}_2 \text{O}_4$, is formed by the action of sodium carbonate on the nitrate; it crystallizes with 4 mols. of H_2O in large, ruby-coloured, rhombic forms, or in anhydrous, slender, yellow needles. It does not melt up to 240° , and explodes readily when heated on platinum foil. The platinochloride $(\text{C}_{23} \text{H}_{25} \text{N}_3 \text{O}_6)_2 \cdot \text{H}_2 \text{Pt Cl}_6$, crystallizes in slender yellow needles.

Amidobrucine hydrochloride, $\text{N H}_2 \cdot \text{C}_{23} \text{H}_{25} \text{N}_2 \text{O}_4 \cdot 3 \text{HCl}$, is obtained by reducing nitro-brucine with tin and hydrochloric acid at the boiling temperature; it crystallizes in colourless prisms, and gives with platinum chloride a yellow, flocculent precipitate which sinters and carbonises at 250 – 251° . It gives with ferric chloride first a green, then a brown coloration; with dilute potassium bichromate, a transient bluish violet coloration; and dissolves in concentrated nitric acid to a yellow liquid, which turns carmine-red on addition of stannous chloride. The free base was not isolated.

The author is investigating the action of bromine on nitro-brucine.

Reaction of Atropine with Mercurous Salts. A. W. Gerrard. (*Journ. Chem. Soc.*, 1886, 632.) When mercurous chloride, nitrate, or acetate are warmed with atropine in the presence of water, the metallic salt is decomposed, with formation of mercurous oxide and a salt of atropine. No compound of atropine with the mercurous salt is formed, as is the case with mercuric salts. The reaction is aided by the addition of alcohol to dissolve the atropine, and it goes better with soluble than with insoluble mercurous salts. By suitable manipulation, the reaction with mercurous nitrate can be obtained with less than 0.001 gram of atropine, and is therefore a delicate test for the alkaloid.

The Tests for Atropine. Prof. F. A. Flückiger. (*Pharm. Journ.*, 3rd series, xvi. 601.) The author confirms Gerrard's observation that atropine and hyoscyamine have an alkaline power resembling that of the hydrates of sodium or potassium, notably so in their action on mercuric chloride, and differing in this respect from (probably all) other alkaloids. They, together with homatropine also differ from all other well-known alkaloids in possessing

the power of reddening phenolphthalein paper. The other tests for atropine are modified and completed by the author in the following way:—

1. 1 milligramme of atropine and about the same quantity of nitrate of sodium are rubbed together by means of a glass rod, the top of which is to be moistened with very little sulphuric acid (1·84 sp. gr.); this may best be performed on a porcelain dish or slab. Then a little sodium hydrate is rubbed in a mortar with absolute alcohol, so as to form a saturated solution. If this is poured drop by drop on the oxidized alkaloid, a red or violet colour is developed.

2. Nitrite of sodium, instead of nitrate, applied in the same way as above, yields an orange mixture, turning red, violet, or lilac, if it is gradually diluted by an aqueous solution of hydrate of sodium, about 1·160 sp. gr.; the caustic lye is to be added in excess.

3. Atropine may be heated to the boiling point in a mixture of one volume of glacial acetic acid and one volume of sulphuric acid (1·84 sp. gr.) without any coloration. At last the boiling liquid begins to display a well marked yellowish green fluorescence. After cooling, the liquid evolves the odour of acetic acid, but besides a very pleasant aromatic smell is distinctly perceptible.

Atropine and Cocaine. Prof. F. A. Flückiger. (*Pharm. Journ.*, 3rd series, xvi. 800.) With regard to the instability of cocaine, its alkalinity and its decomposition by water, the author confirms some of his own previous results and some of those of other observers. He has, moreover, observed that atropine is decomposed by prolonged heating with water in a closed tube at below 100°.

Cocaine and its Salts. A. B. Lyons. (*Journ. de Pharm.* [5], xiii. 197–202.) The leaves of the coca plant do not contain more than 0·8 per cent. of cocaine, some were found to contain as little as 0·15 per cent. To assay the leaves, the author macerates them, finely powdered, with eight times their weight of a mixture of 95 volumes of ether and 5 volumes of ammonia; after twenty-four hours the alkaloid is separated from an aliquot portion of the liquid, dissolved in acidified water, and extracted from this solution by means of ether and an alkali; the ether is then evaporated, and the alkaloid is weighed. The leaves rapidly deteriorate in value, so that in about six months they are assumed to be worthless. The product from deteriorated leaves is always more or less coloured, and very little of it is crystallizable; that from good leaves is almost colourless and easily crystallizes. Cocaine is soluble in

chloroform, benzene, light petroleum, carbon bisulphide, fused vaseline, fixed and volatile oils, and in 2,000 parts of water. Cocaine hydrochloride is not hygroscopic. It is easily soluble in alcohol, less easily in absolute alcohol and in chloroform; it is practically insoluble in ether, light petroleum, and fixed and volatile oils. The crystals from the aqueous solution contain 9.6 per cent. of water, whilst those obtained from the alcoholic solution are anhydrous. The hydrobromide crystallizes readily from its aqueous solution in transparent prisms with 2 mols. H_2O , stable in the air. The citrate crystallizes with difficulty, and is hygroscopic. Cocaine gives a crystalline salt with oleic acid, also with boric, sulphuric, and oxalic acids. Cocaine in alcoholic solution, when treated with potassium hydroxide, is rapidly decomposed with formation of ethyl benzoate; and after a short time the solution contains benzoic acid, with only traces of the alkaloid. Lime and ammonia act similarly but more slowly. MacLagan has shown that concentrated hydrochloric acid decomposes cocaine into benzoic acid, ecgonine, and methyl alcohol. Calmels and Gussin have shown that baryta produces the same effect when a solution of cocaine hydrochloride is heated with it in a sealed tube at 120° . Impure cocaine, under the action of acids, frequently gives a green coloration. Mayer's reagent gives a faint turbidity in a solution containing one-millionth only of cocaine. Iodated potassium iodide gives a rose precipitate with one part of hydrochloride in 7,500 of water. Phosphomolybdic acid or tannin gives a clear precipitate with one part in 12,500 of cocaine. Caustic alkalies give a crystalline precipitate from dilute solutions; from concentrated solutions, the precipitate is amorphous at first, but gradually becomes crystalline. Ammonia, alkaline carbonates, and alkaline hydrogen carbonates give amorphous precipitates which similarly become crystalline.

Cocaine and its Salts. Dr. B. H. Paul. (*Pharm. Journ.*, 3rd series, xvi. 325-327.) The author's experiments indicate that the solubility of cocaine in water is much less than 1 in 700; moreover, that on evaporating the aqueous solution, the cocaine is decomposed, leaving a gummy mass, which crystallizes and has many properties similar to those attributed to ecgonine. It yields benzoic acid by the action of caustic soda, lime, or sodium carbonate, but not apparently by the action of hydrochloric acid. It combines with benzoic acid, but can be separated from the acid by repeated crystallization from water. Cocaine hydrochloride is only slightly soluble in water, from which solution it can be crystallized

with water of crystallization; but after prolonged heating on a water-bath, it remains in a resinous state for a considerable time at least. The acetate is very soluble, and is difficult to crystallize, owing to the volatilization of the acetic acid during evaporation. The solution of the benzoate dries to a thick, gummy residue. Ammonia precipitates the alkaloid without apparent decomposition, and when added in excess does not redissolve it.

Benzoyl-Ecgonine and Artificial Cocaine. W. Merck. (*Ber. der deutsch. chem. Ges.*, xviii. 1594 and 2264-2266.)

Benzoyl-ecgonine, $C_9H_{14}NO_3Bz$, is obtained as a bye-product in the preparation of cocaine. It crystallizes in colourless, flat prisms, melts at $188.5-189^\circ$, turning brown at the same time, and is readily soluble in water, more sparingly in alcohol, nearly insoluble in ether. When heated with hydrochloric acid at 100° , it is resolved into benzoic acid and ecgonine.

Artificial Cocaine.—Cocaine may be prepared by heating benzoyl-ecgonine with a slight excess of methyl iodide and an equal volume of methyl alcohol in a sealed tube at 100° .

Benzoyl-Ecgonine and its Conversion into Cocaine. Z. H. Skraup. (*Monatsh. Chem.*, vi. 556-562. From *Journ. Chem. Soc.*) The author confirms Merck's observation (see preceding abstract) as to the occurrence of benzoyl-ecgonine as a bye-product in the preparation of cocaine. The base crystallizes in transparent prisms of the composition $C_{16}H_{19}NO_4 + 4H_2O$. When quickly heated it melts at $90-92^\circ$; sometimes it does not melt below 120° or 140° . The substance which melted at 90° generally resolidifies as the temperature rises, and melts again at 192° . The acetate and sulphate crystallize in prisms. The aurochloride, $C_{16}H_{19}NO_4 \cdot HAuCl_4$, forms small, yellow, anhydrous scales, which are soluble in alcohol and sparingly soluble in water. The base is decomposed by the action of hydrochloric acid in sealed tubes at 100° , yielding methyl chloride, benzoic acid, and ecgonine.

Benzoyl-ecgonine is converted into cocaine by the action of methyl iodide.

Benzoyl-Ecgonine. Dr. B. H. Paul. (*Pharm. Journ.*, 3rd series, xvi. 818.) The author supplements his previous report on this substance with the following information:—

Benzoyl-ecgonine may be easily produced by heating cocaine with about twenty parts of water in a closed tube. At first the cocaine melts when the temperature is about $90^\circ C.$, but it gradually dissolves on maintaining the heat at $100^\circ C.$, while bubbles of gas or vapour escape from the mass. The change is facilitated by

occasionally shaking the tube so as to distribute the melted cocaine through the water in globules, and thus extend the surface of contact. After about twelve hours a perfectly clear solution is obtained, and on testing this with litmus paper it has only a very faint acid reaction, if the cocaine used has been purified by recrystallization from alcohol. With impure cocaine, on the contrary, the acid reaction of the liquid is often very decided. By evaporating the liquid to a small bulk, the benzoyl-ecgonine crystallizes in needles, closely resembling ammonium oxalate. These crystals, when dried by exposure to the air, retain some combined water, and they melt when heated; but when dried over oil of vitriol they become opaque, and then no longer melt when heated in the water bath. In his former paper it was stated that he could not then succeed in obtaining benzoic acid from this substance by heating it with concentrated hydrochloric acid, and this was due to the very small quantity of material he had to deal with, which was less than half a gram. He now finds that it does yield benzoic acid when heated with strong hydrochloric acid, as well as by the action of caustic soda.

Chemically this substance differs from cocaine only by C H_2 ; or in other words, it is cocaine in which a methyl group (C H_3) has been replaced by hydrogen.

Constitution of Cocaine. G. Calmels and E. Gossin. (*Comptes Rendus*, c. 1143–1146; *Journ. Chem. Soc.*, 1885, 912.) Cocaine platinochloride has the formula $(\text{C}_{17}\text{H}_{22}\text{N O}_4\text{Cl})_2\text{Pt Cl}_4$. When the hydrochloride is heated with water and baryta in sealed tubes at 120° , it splits up in accordance with Lossen's equation,—



the actual products being methyl alcohol, barium benzoate, and a compound of barium benzoate and the barium salt of ecgonine, which forms slender prismatic needles, very soluble in water and alcohol, only slightly soluble in ether.

This double compound forms a convenient source of ecgonine. Ecgonine platinochloride, $(\text{C}_9\text{H}_{16}\text{N O}_3\text{Cl})_2\text{Pt Cl}_4$, is extremely soluble in water, but much less soluble in alcohol, provided the latter does not contain platinum tetrachloride. It is obtained as a yellow powder by precipitating it in absolute alcohol, or in red prisms by adding alcohol to the aqueous solution. A modified salt, $(\text{C}_9\text{H}_{15}\text{N O}_3)_2\text{Pt Cl}_4$, is obtained by heating solutions of the preceding compound. It forms yellowish needles, very soluble in water, but almost insoluble in alcohol, even in presence of platinum

tetrachloride. Ecgonine aurochloride is a greenish yellow gummy compound, very soluble in water and alcohol. Ecgonine has a neutral reaction, but combines with alkalies to form gummy compounds, which are very soluble in water and in alcohol, and crystallize with great difficulty. They have a faintly alkaline reaction.

When ecgonine is heated with moderately strong sulphuric acid, neither carbonic oxide nor formic acid is formed, but an alkaloid is obtained which stands in the same relation to ecgonine as ether to alcohol. It forms a barium salt of the composition $C_{18}H_{26}N_2O_5Ba$, and its basic or acid salts are less soluble and crystallize more readily than those of ecgonine. The hydrochloride crystallizes in stellate groups of prismatic needles, and the platinochloride forms feathery groups of large crystals, very soluble in water and in alcohol.

When the double barium compound obtained by the action of baryta on cocaine is subjected to destructive distillation, it yields an isotropine, the hydrochloride of which has the composition $(C_8H_{15}NO)_2, H_2PtCl_6$, and forms bulky orange-red deliquescent crystals.

It would seem that cocaine, ecgonine, and isotropine are derivatives of ethyl tetrahydropyridine; isotropine is methoxyethyltetrahydropyridine, ecgonine is methoxyethyltetrahydropyridine-carboxylic acid, cocaine is methyl benzomethoxyethyltetrahydropyridinecarboxylate.

Cocaine Benzoate. Dr. B. H. Paul. (*Pharm. Journ.*, 3rd series, xvi. 817.) According to M. Bignon, the benzoate is easily obtainable by mixing cocaine with benzoic acid to neutralization, the proportions being 122 of the acid to 303 of cocaine. M. Bigon does not, however, give any description of the benzoate as a definite compound, but merely the mode of preparing a solution containing 5 per cent. of it. Former attempts made by the author to prepare this salt failed to yield it in a crystalline condition, the solution obtained by neutralizing cocaine with benzoic acid drying upon evaporation to a thick gummy residue.

More recently the author has examined a light crystalline powder supplied as cocaine benzoate by a well-known French manufacturer, and to his surprise found that it contained neither cocaine nor benzoic acid. This led to further attempts on his part to prepare this salt. He found that on mixing the two substances in suitable proportions, with only a drop or two of water, they readily combined, forming a thick liquid, which dried up, on ex-

posure to a surface of oil of vitriol, to a gummy mass, and after some days' exposure in a cold place it presented a crystalline structure. Several products similarly obtained by Martindale had the same characters; and on redissolving these in about their own weight of moderately warm water, solutions were obtained which gave on cooling, and after standing some time, acicular crystals, quite different, however, from those obtained from a solution of the "cocaine benzoate" procured from Paris. A solution of these crystals gave with ammonia and hydrochloric acid the precipitates characteristic of cocaine and benzoic acid salts; in both respects, therefore, differing from the French article. A further examination of this latter substance enabled the author to ascertain that it was identical with the body previously described by him as produced by the action of water and heat upon cocaine, viz., benzoyl-ecgonine, and it became a question how this substance could have been taken for cocaine benzoate. Considering the source from which this article had been obtained, there seemed to be every reason to suppose that it had been produced as the result of some unobserved alteration that had taken place in the attempt to prepare a true cocaine benzoate. Experiments undertaken with the object of throwing light on this subject were so far unsuccessful, but are still being continued.

A New Reaction of Cocaine. Dr. F. Giesel. (*Pharmaceut. Zeitung*, February 27, 1886, 132; also *Schweiz-Wochenschrift*, 1886, 88.) If 1 centigram of cocaine hydrochlorate is dissolved in one or two drops of water, and about 1 c. c. of a 3 per cent. solution of potassium permanganate added, a violet precipitate of cocaine permanganate is produced, at an ordinary temperature, containing but a trace of manganese dioxide, and when boiled no odour of bitter almonds is perceptible.

The Reaction of Cocaine Salts with Potassium Permanganate. Dr. A. B. Lyons. (*Amer. Journ. Pharm.*, 1886, 240.) Potassium permanganate has been recently proposed by F. Giesel as a test for cocaine (see preceding abstract). If to a strong solution of pure cocaine hydrochlorate is added decinormal solution of potassium permanganate, there is produced a precipitate of a deep violet-purple colour, consisting of a permanganate of the alkaloid. The salt is very unstable, and if left to itself decomposes spontaneously in a few hours, leaving behind a deposit of the dark brown hydrated peroxide of manganese.

If examined with a microscope when first thrown down, the precipitate will be found to consist wholly or in part, according

to the strength of the cocaine solution, of translucent violet-red crystals of great beauty. These assume the form of rhombic (nearly rectangular) plates, of which several are frequently grouped in a rosette-like arrangement. A solution containing 5 per cent. of cocaine hydrochlorate yields at once a copious deposit of crystals. Solutions containing 2 per cent. of the salt gave crystals after a short time. When the proportion of cocaine was reduced to 1 per cent., crystals formed only as evaporation took place, and a solution of one-half this strength yielded only a few crystals. In all cases there appeared simultaneously with the crystals amorphous floccules of the manganic hydrate, and the crystals would shortly disappear, leaving behind the same unsightly residue.

If the solution containing the deposit is heated to boiling, the same change takes place at once, but the decomposition of the salt is not attended with the evolution of any peculiar odour.

The behaviour of impure products will vary, naturally, with the nature of the impurity. The amorphous cocaine hydrochlorate, which is now, however, not often met with, generally manifests its impurity by an immediate reduction, in the cold, of the permanganate solution. The first drop or two of the reagent produces a brown discoloration in the fluid, and the precipitate thrown down by an excess is more or less brown, instead of being of a distinct violet-purple or red.

On heating the mixture cautiously, there is developed also in solutions of these impure products an odour in some cases resembling that of the oil of bitter almonds, in others like that of crude cocaine. The development of this foreign odour is interfered with, at least in some cases, by an excess of this reagent.

The characters which a pure hydrochlorate of cocaine should possess may be stated as follows:—

It should be nearly or quite odourless; it should never have an acid odour, or one resembling benzoic acid. The reaction should not be strongly acid to litmus. The salt should dissolve in sulpho-molybdic acid, without producing any transient brown coloration, or any immediate coloration whatever. It should dissolve also in sulphuric acid to a colourless solution. A 2 per cent. solution of the salt should not become brown on addition of a drop or two of decinormal solution of potassium permanganate, neither should the solution develop any strong foreign odour on heating after the addition of a larger quantity of the permanganate. The precipitate produced in stronger solutions by permanganate

must be of a clear, violet-purple or red colour, and must consist, at least in part, of distinct rhombic crystals of cocaine permanganate.

Preparation of Cocethyline, a Homologue of Cocaine. W. Merck. (*Ber. der deutsch. chem. Ges.*, xviii. 2952-2955.) *Cocethyline*, $C_{18}H_{23}NO_4$, is prepared by heating benzoyl-ecgonine with ethyl iodide and alcohol for eight hours at 100° . It crystallizes from alcohol in splendid prisms with vitreous lustre, melting at $108-109^\circ$. The *platinochloride* forms bright yellow rhombic plates; it resembles cocaine platinochloride, but is more crystalline. Like cocaine the base is an anæsthetic.

Hopeine. (*Journ. de Pharm.* [5], xii. 460-462.) This crystallizable narcotic alkaloid can only be obtained with difficulty, as most varieties of hops do not contain more than traces. It was first obtained from wild American hops. The investigations of Smith, Williamson, Myers, and Springmühl, show that the pure alkaloid has an energetic action similar to that of morphine. German hops contain only traces of it; some English varieties have given 0.05 per cent., whilst American wild hops have yielded 0.15 per cent. In the pure form it is obtained as brilliant white needles, or as a white, crystalline powder, soluble in 800 parts of water at 15° , and in 50 parts of alcohol at 15° ; it crystallizes out on cooling the hot alcoholic solution. To extract hopeine, hops are digested with a 16 per cent. solution of glucose, containing a little acetic acid, then boiled for six hours under pressure. The liquid is filtered through carbon, and is evaporated until the sugar crystallizes. The alkaloid is extracted from the residue by means of alcohol, and the solution filtered and evaporated. The residue is treated with ether and alkali to separate certain alkaloids present, and finally pure hopeine is obtained by repeated crystallizations of its alcoholic solutions.

Hopeine. A. Ladenburg. (*Ber. der deutsch. chem. Ges.*, xix. 783-785.) The author finds hopeine to be identical with morphine. The specimen obtained by Williamson from wild American hops, and to which the formula $C_{18}H_{20}NO_4 \cdot H_2O$ was ascribed (compare *Chem. Zeit.*, 1886, 10, 20, 38, 147), proved to be a mixture of morphine and a more readily soluble base.

Note on a Sample of Hopeine. Dr. B. H. Paul. (*Pharm. Journ.*, 3rd series, xvi. 877, 878.) The author arrives at the conclusion that the greater part of the substance called "hopeine" is really morphine, and that if it be not morphine obtained from opium, it is so like morphine derived from that source as to be

indistinguishable from it. Some samples were found to contain variable proportions of a second alkaloid identical with cocaine; and in one sample obtained through Mr. Gerrard, the last-named base was found to be the predominating constituent. The author points out that there are but two ways of accounting for these results. Either there is in the wild hop of Central America a very remarkable association of two alkaloids, known to occur in two extremely different plants, or we have a case of an article improperly put forward as a substance of natural origin, though really a fictitious mixture.

Aconitine. A. Jürgens. (*Archiv der Pharm.* [3], xxiv. 127, 128, 172; *Journ. Chem. Soc.*, 1886, 565.) Aconitine crystallizes in anhydrous forms, which vary with the nature of the solution from which they have been obtained; whilst from an aqueous solution the aconitine separates in an amorphous form. It has a pricking, burning taste, but is not bitter. It is soluble in about 64 parts of absolute ether, 37 parts of absolute alcohol, 2,800 parts of light petroleum of 0.670 sp. gr., $5\frac{1}{2}$ parts of benzene and chloroform, and 750 parts of water. Pure aconitine does not give colour-reactions with phosphoric acid, sulphuric acid and sugar, or phosphomolybdic acid and ammonia, etc., the colours described by some authors being due to resinous substances in the impure material. Aconitine can, however, be readily detected under the microscope, as follows:—A minute quantity is dissolved in water, acidified with acetic acid, and a particle of potassium iodide is added; on allowing the solution to evaporate, characteristic crystals of aconitine hydriodide appear, which remain after dissolving out with water the potassium iodide crystals simultaneously formed. The alkaloid-group reagents act as follows on aconitine solutions:—Iodine-water, a reddish brown precipitate in a solution of 1:20,000; potassium mercury iodide, a precipitate in 1:10,000. Brominated potassium bromide, potassium bismuth iodide, and iodized potassium iodide, behave similarly. Gold chloride, phosphomolybdic acid, and phosphotungstic acid indicate aconitine in a solution of 1:5,000; picric acid in 1:4,000; and tannin and potassium nitrite in 1:2,000. An alcoholic solution of aconitine reduces silver nitrate, but its salts do not thus reduce the silver salt. Analysis of aconitine indicates the formula $C_{33}H_{47}NO_{12}$.

Characters of Aconitines. K. F. Mandelin. (*Archiv der Pharm.* [3], xxiii. 177.) The old tests for aconitine are described by the author as worthless. Pure aconitine should give a colourless solution in concentrated sulphuric acid, which should not be

darkened by the addition of a few drops of strong sugar solution. This substance is also precipitated in very dilute solutions by mercuric bromide, picric acid, and other reagents, whilst aconine is only thrown down in stronger solutions. Pseudoaconitine may be recognised by its yielding protocathechuic acid when treated with potash, by its reaction with fuming nitric acid and alcoholic potash, and by its behaviour with sulphovanadic acid. Evaporated on a watch-glass, with a little fuming nitric acid, a yellow residue is obtained, which gives a purple-red coloration on addition of alcoholic potash. A solution of pseudoaconitine in strong sulphuric acid yields a violet coloration, with sulphovanadic acid. With all these reagents aconitine gives negative results.

About 3 mgrms. of aconitine would be sufficient to kill a man, whilst as a medicinal dose not more than 0.1 mgrm. should be taken at once. The author recommends the pharmacodynamic method as the best one for estimating the strength of an aconitine preparation.

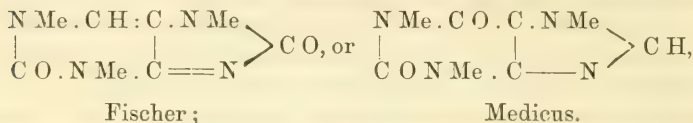
Contribution to the Solution of the Aconitine Question. K. F. Mandelin. (*Archiv der Pharm.*, 1885, xxiii.) This paper is an elaborate *résumé* of the entire literature of the subject, but is not suited for useful abstraction. Reference should therefore be made to the original article, or to a copious translation of the same which will be found in the *Pharmaceutical Journal*, 3rd series, xvi. pp. 703, 727, 781, and 801.

Derivatives of Caffeine. E. Schmidt and E. Schilling. (*Liebig's Annalen*, ccviii. 141-176.) In previous communications the authors have described caffeine methylhydroxide and some of its decomposition-products. Caffeine is decomposed by boiling with baryta-water, yielding carbonic anhydride and caffeidine; the latter base is also decomposed by the continued action of the reagent, and it splits up into methylamine, sarcosine, formic acid, and carbonic anhydride. On boiling with baryta-water, caffeine methylhydroxide splits up directly into methylamine, sarcosine, formic acid, and carbonic anhydride. Neither caffeidine nor methylcaffeidine can be detected amongst the decomposition-products.

Methylcaffuric acid, $C_7H_{11}N_3O_4$, is prepared by boiling allo-caffeine in water until the evolution of carbonic anhydride ceases. The substance crystallizes in needles melting at 167° . It dissolves freely in water, alcohol, and chloroform. It is decomposed by basic lead acetate into mesoxalic acid, methylamine, and dimethylcarbamide.

In caffeine methylhydroxide, the group $\text{C H}_3 \cdot \text{O H}$ appears to be attached to that N-atom which is present in caffeine as an ammonia, not as a methylamine residue; since caffeine methylhydroxide, unlike caffeine, yields on decomposition methylamine, and not ammonia.

It is not possible to decide from these experiments which of the following formulæ represents the constitution of caffeine, but the authors are inclined to give the preference to Fischer's formula:—



Note on Quinine Hydrate. F. W. Fletcher. (*Pharm. Journ.*, 3rd series, xvi. 385.) The experiments recorded in this paper lead to the following conclusions:—

Quinine, as obtained by precipitation with ammonia, and allowed to dry in the air without the aid of heat, until it ceases to lose weight, has the composition of a monohydrate, and not a trihydrate, as has been sometimes supposed. The alkaloidal residue of an ethereal solution of quinine becomes constant in weight if dried by exposure to the air at ordinary temperatures, and under these conditions its composition approximates closely to that of a monohydrate. Dried over sulphuric acid, the same residue remains constant in weight, and likewise contains one molecule of combined water.

Note on Quinine Sulphate. Dr. O. Hesse. (*Pharm. Journ.*, 3rd series, xvi. 818, 819.) The author finds himself constrained to withdraw the optical test which he had recommended. In doing this, however, he adds that up to the present moment no optical test is known by which the amount of cinchonidine can be determined, either in commercial quinine sulphate and other quinine salts, or in cinchona bark, with any satisfactory degree of accuracy.

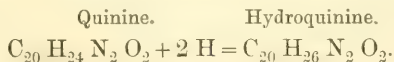
Note on Quinine Hydrate. Prof. F. A. Flückiger. (*Pharm. Journ.*, 3rd series, xvi. 897.) The author's experiments lead to the conclusion that, although monohydrate and dihydrate of quinine seem to exist, the only crystallized hydrate as yet known is the trihydrate; the other hydrates are amorphous.

Note on Quinine Hydrate. Dr. O. Hesse. (*Pharm. Journ.*, 3rd series, xvi. 937.) The conclusions arrived at by the author

are confirmatory of the results obtained by Prof. Flückiger, which will be found in the preceding abstract.

Note on Quinine Sulphate. Dr. O. Hesse. (*Pharm. Journ.*, 3rd series, xvi. 1025, 1026.) The author offers some further unfavourable criticism respecting the accuracy of the optical method of quinine testing, and again disputes Dr. de Vrij's statement relative to the occurrence of large percentages of cinchonidine in the sulphate of quinine of commerce. To throw further light on this subject, he has again determined the rotatory power of the tartrates under the conditions laid down by Oudemans, and has obtained data differing from those published. Thus, for quinine tartrate with the concentration A., he has obtained $(\alpha)_D = -216.6^\circ$, and for the cinchonidine tartrate $(\alpha)_D = -134.6^\circ$. Oudemans found respectively 215.8° and 131.3° . Adopting the author's data in the calculation of the results, there is a still greater difference. On the other hand, it is admitted that cinchonidine can be most accurately determined in the presence of quinine by the optical method. But this apparent paradox finds its explanation in the fact that commercial quinine sulphate contains hydroquinine, which acts upon the plane of polarized light in a way different from quinine and cinchonidine.

Hydroquinine is associated with quinine in cinchona bark, and it is derived from quinine by the addition of hydrogen:—



It is a saturated compound, while quinine is not.

The neutral sulphate of this alkaloid crystallizes in short needles, with eight, and sometimes six, molecules of water. It dissolves readily in boiling water, sparingly in cold water; the anhydrous salt requiring 348 parts of water at $15^\circ C$. for solution. When 5 c.c. of such a solution is mixed with ammonia of 0.96 sp. gr., the quantity requisite for complete solution of the alkaloid is 25 c.c. Accordingly, it might be inferred that the presence of this alkaloid would be easily recognisable by means of the test given in the German Pharmacopœia. But that is not the case, and it would appear that the sulphate does not exist in the free state in quinine sulphate, but in a state of combination with it. Under this condition, quinine sulphate crystallizes in long, delicate needles. By repeatedly recrystallizing from water quinine sulphate containing the hydroquinine salt, it is possible to obtain a product containing a smaller amount of hydroquinine; but the separation cannot be

carried so far as to yield in this way perfectly pure quinine sulphate. Hydroquinine cannot be separated completely except by converting quinine sulphate into the acid salt, and recrystallizing this from water or alcohol. The hydroquinine then remains in the mother liquors.

Hydroquinine tartrate, $(C_{20}H_{26}N_2O_2)_2C_4H_6O_6 + H_2O$, is almost as sparingly soluble in water as the corresponding quinine salt. Consequently, when commercial quinine sulphate is subjected to precipitation with a soluble tartrate, the precipitated tartrate thus obtained will contain the whole of the hydroquinine that may be present.

The author states that so far as the value of quinine sulphate as a febrifuge is concerned, the presence of hydroquinine in the medicinal salt is not of any great importance, because its action as a therapeutic agent is of the same kind as quinine sulphate. But when the optical method of testing is applied to such a salt, the result is that the hydroquinine sulphate present in it produces an effect similar to that of cinchonidine sulphate in the proportion of 1 : 0.42; and it is in this way that the optical method of testing leads to a result that is incorrectly unfavourable so far as it relates to the amount of cinchonidine thus apparently indicated. The mode in which this result is produced will become evident from the following comparison of the rotatory powers of the respective tartrates, as determined by the author according to Oudemans' directions for the concentration B.

	(a) _D
Quinine Tartrate equals	-212.5°
Hydroquinine Tartrate „	-176.9°
Cinchonidine Tartrate „	-132.0°

Hence the rotatory power of hydroquinine being nearly intermediate between that of quinine and cinchonidine, and all three alkaloids exercising an effect in the same direction, it is scarcely possible to carry out their determination in a mixture by means of the optical method. Commercial quinine sulphate contains a sensible percentage amount of hydroquinine, and for every unit of hydroquinine sulphate a result would be obtained the same as if 0.42 per cent. of cinchonidine sulphate were present. It is for this reason that the amount of cinchonidine sulphate is generally indicated too high by several units per cent. by the optical method. Instances have indeed been met with in which the optical method has given data indicating the presence of some two per cent. of cinchonidine sulphate in material that did not contain a trace of it.

Test for Quinine. A. Vogel. (*Sitzungsber. der Akad. der Wissensch.*, München, 1885, 1; *Journ. Soc. Chem. Ind.*, December, 1885.) The author has modified his original test for quinine, which consists in mixing bromine water, yellow prussiate of potash, and borax, with a solution of quinine, by substituting a weak alkaline compound—as for example, marble, felspar, or powdered glass—for the borax. When to a mixture of bromine water, ferrocyanide of potassium, and sulphate of quinine, a small piece of marble is added, the latter is at once covered with a red film. Strychnine, cinchonine, and caffeine do not give similar reactions. If a solution of morphine be boiled with excess of bromine water, neutralized with CaCO_3 , and again boiled, a red coloration is produced, even when diluted to 1 in 1,200. When more dilute, a yellow or brown coloration is obtained. If a weak HCl solution of narcotine be treated with a small excess of bromine water, and neutralized with calcium carbonate, the liquid becomes red. When the solution contains more than 1 in 1,000, the red colour changes to violet and blue. The coloration is weaker in presence of tartaric or acetic acids. In testing quinine in bark, the tannin present must be first eliminated with gelatine solution containing NH_4Cl .

Assay of Quinine Sulphate. J. E. de Vrij. (*Chem. Centr.*, 1885, 968; *Journ. Chem. Soc.*, 1886, 397.) The quantity of cinchonidine sulphate in commercial quinine sulphate may be determined in the following way:—5 grams of the quinine sulphate are dissolved in 11 c.c. of normal sulphuric acid at 60° . The solution is evaporated to the point of crystallization, and cooled. Enough distilled water is then added to replace the weight lost during evaporation. The cinchonidine is dissolved as acid sulphate, and may be separated from the clear liquid by precipitating with soda solution, and agitating with 25 grams of ether. The crystals of cinchonidine are dried and weighed. This method will detect 2 per cent. of cinchonidine in quinine sulphate.

Cinchonidine in Commercial Quinine Sulphate. A. J. Cownley. (*Pharm. Journ.*, 3rd series, xvi. 797.) With regard to the statement made by De Vrij (*Year-Book of Pharmacy*, 1885, 125), that commercial quinine sulphate contains above 5 per cent. of cinchonidine sulphate, the author points out that such is the case only in inferior kinds of quinine sulphate; for out of 28 samples of quinine sulphate examined by a very delicate method, some were found to contain none, only two 5 per cent. or over, whilst the average was 2.04 per cent. of cinchonidine sulphate. Hence, as

De Vrij worked with brands of the highest repute, it is inferred that the method employed is in fault.

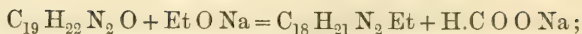
The Determination of Quinine in the Presence of other Cinchona Alkaloids. Y. Shimoyama. (*Zeitschr. für Analyt. Chem.*, xxiv. Part iv.) The author has critically examined Dr. de Vrij's method of estimating quinine as herapathite, and shows this method to be fallacious in the presence of a large proportion of cinchonidine. Heilbig's proposal for effecting the separation of quinine from cinchonidine is also impracticable. According to his directions the dilution is insufficient for retaining the cinchonidine in solution. The plan he recommended is, however, applicable in cases where it is required to determine quinine in a solution containing no other cinchona alkaloid but quinine.

The author's own method for determining quinine in a mixture of cinchona alkaloids is as follows:—A quantity of not less than 0.5 gram of the mixed alkaloids is placed in a beaker and dissolved at a very gentle heat in 30–40 c.c. of water, with the aid of the smallest quantity of dilute acetic acid required. When the solution is cold it is filtered into a tared beaker, the filter carefully washed, and the filtrate neutralized with a very dilute soda-lye. If any insoluble substance separates out, the liquid is filtered through a very small filter, and the filtrate is mixed with a suitable proportion of a solution of sodium oxalate saturated at 18°. One c.c. is required for every 0.1 gram of the mixture of alkaloids taken for analysis. The liquid is evaporated on the water-bath down to 8 to 10 grams, until a distinct separation takes place on cooling. From 10 to 15 c.c. of water are then added to the contents of the beaker, and the whole is stirred until the smeary mass which separated out along with the precipitate of oxalate is completely dissolved. The beaker is then set aside for three hours at 18°, stirring frequently. The weight of the contents of the beaker is determined, the precipitate is filtered upon a double filter, washed several times, with the aid of a filter-pump, with a solution of quinine oxalate saturated at 18°, rinsed with 50 c.c. of a saturated solution of quinine oxalate into a capacious flask, well shaken for fifteen to twenty minutes, and set aside for two hours at 18°, shaking from time to time. The precipitate is collected upon a double filter, which has been dried at 110°, and weighed and washed with a saturated solution of quinine oxalate, using a filter-pump. The moist filter with the precipitate is weighed between watch-glasses to ascertain the quantity of the saturated solution of quinine oxalate contained in it, dried for three hours, and weighed again.

If for every gram of the difference of weight ascertained (quantity of water of the saturated solution of quinine oxalate) we deduct 0.00069 gram from the obtained quantity of dry quinine oxalate, we obtain the quantity of the precipitated quinine oxalate. If the latter is subtracted from the ascertained weight of the contents of the beaker, we find the weight of the mother-liquor. By multiplying its weight in grams with 0.00064, we obtain the quantity of the quinine oxalate which remains in solution in the mother-liquor, which must then be added as a correction to the weight of the separated salt. 1 gram of quinine oxalate represents 0.878 gram of quinine. In the determination the above-mentioned temperature must be carefully adhered to, as even small fluctuations of heat produce considerable differences in the results. If the total quantity of the alkaloids contains only 20 per cent. of quinine, the separation of the oxalate sometimes only begins after two to three hours. For the complete separation of the quinine oxalate it is important to stir the liquid frequently. If the quinine is less than 20 per cent. of the total alkaloids this method is not applicable.

Action of Lime on Quinine. A. R. Haslam. (*Chemical News*, lii. 97.) Experimental evidence is adduced to show that quinine is decomposed by heating with lime at low temperatures. 1 gram of quinine sulphate mixed with lime was found to lose 0.032 gram after exposure to a temperature of 70° for four hours; whilst at 100° the mean loss in five experiments was 5 per cent.

Action of Alcoholic Soda Solution on Cinchonine. A. Michael. (*Amer. Chem. Journ.*, vii. 182-188.) The best results were obtained by heating 6 grams of caustic soda, 6 grams of cinchonine, and 60 c.c. of absolute alcohol at 130-135° for eight to ten hours; no gaseous products were formed. The contents of the tubes were freed from alcohol, a large quantity of water added, and the whole extracted with ether. The ethereal extract, when evaporated and distilled with steam, yielded a very small quantity of volatile bases, about 1 per cent. of the cinchonine employed. The bases not volatilized by steam amounted to over 80 per cent. of the cinchonine employed; they could not be separated by distillation, but fractional precipitation with platinum chloride showed that the material was almost perfectly homogeneous. The free base, $C_{20}H_{26}N_2$, is a heavy, reddish yellow, viscous oil; the salts are, so far as examined, amorphous, except the platinochloride, $C_{20}H_{26}N_2 \cdot H_2PtCl_6$. The aqueous alkaline solution left after extraction with ether contains formic acid. The reaction is therefore probably expressed by the equation—

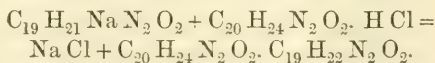


whence cinchonine would be an amide of the base $C_{18}H_{22}N_2$, and of formic acid; the volatile bases obtained by other experimenters are decomposition-products of the base here described.

Products of the Action of Alkalies on Cinchonine and other Cinchona Alkaloids. A. Krakau. (*Ber. der deutsch. Chem. Ges.*, xviii. 1934, 1935.) By heating cinchonine with caustic alkalies at 200° in a current of superheated steam, the author has obtained, together with quinoline and lepidine, a solid substance that remains in the fused mass, and a very viscid dextrorotatory oil which distils with the steam. Similar products were obtained from cinchonidine. Quinidine and quinine also yield a solid substance and an oil; the latter contains a dextrorotatory and two inactive bases, one of which yields a hydrate melting at 52° .

Cupreine and Homoquinine. Dr. O. Hesse. (*Pharm. Journ.*, 3rd series, xvi. 622-625.) The author discusses the nature of homoquinine, and in reference to the opinions expressed by Paul and Cownley, that the differences presented by it from cupreine and quinine, and by the corresponding salts, may be taken as indications that homoquinine is a distinct alkaloid, he puts forward the view that these differences may be due to the combination of quinine with cupreine. Hence he thinks that the ready solubility of homoquinine in alcohol, and the impossibility of obtaining it from this solution in any other than the amorphous condition, is not surprising; and further, that the appearance and behaviour of some homoquinine salts also furnish as little evidence of the individuality of homoquinine.

The author considers that cupreine being a diamine base, is therefore biacid, and that it is also, in virtue of its phenol nature, monobasic. Hence it can combine with two molecules of a monobasic acid, and also with one atom of a metal, such as K or Na. When either of the latter compounds is brought together with an equivalent quantity of quinine hydrochlorate, a precipitate is formed that consists essentially of homoquinine,—



The author argues that this simple mode of forming homoquinine proves that the substance is only a compound of quinine and cupreine in equal molecular proportions, and he refers to his analytical results as to the amount of quinine in homoquinine as being in harmony with this view.

Lastly, the hydration of crystallized homoquinine has been redetermined by the author, and he finds it amounts to 10·38 per cent., as against 10·19 per cent. calculated in accordance with the formula—



Derivatives of Apocinchine. W. J. Comstock and W. Königs. (*Ber. der deutsch. chem. Ges.*, xviii. 2379–2387.) A previous notice of this chinchona alkaloid will be found in the *Year-Book of Pharmacy*, 1885, 58.

Methylapocinchine, $\text{C}_{18}\text{H}_{16}\text{N} \cdot \text{O Me}$, is obtained by heating apocinchine with methyl iodide, methyl alcohol, and potash in a reflux apparatus for ten hours, and extracting the product with ether after distilling off the methyl alcohol; the ethereal solution is washed with water and with soda, and treated with solid potash, when, after a time, yellow needles of the potassium-derivative of methylapocinchine separate. This is purified by conversion into the sulphate or hydrochloride, treatment with animal charcoal, etc. The free base is an oil readily soluble in alcohol, ether, acetone, chloroform, benzene, light petroleum, and ethyl acetate; nearly insoluble in water. The *hydrochloride*, $\text{C}_{18}\text{H}_{16}\text{N} \cdot \text{O Me}, \text{H Cl} + \frac{1}{2}\text{H}_2\text{O}$, is obtained in light yellow crystals, melting at about 198° .

Ethylapocinchine, $\text{C}_{18}\text{H}_{16}\text{N} \cdot \text{O Et}$, is prepared in a manner similar to the methyl compound; it crystallizes in colourless prisms, and melts at $70\text{--}71^\circ$. When heated at $130\text{--}140^\circ$ with hydrochloric acid, it yields ethyl chloride and apocinchine. If apocinchine is heated with ethyl iodide and ethyl alcohol, without the addition of potash, ethyl apocinchine is not formed, the product being apocinchine hydriodide and a crystalline substance, probably apocinchine ethioidide.

Methylapocinchinic acid, $\text{C}_{19}\text{H}_{17}\text{NO}_3$, is prepared by boiling methyl apocinchine sulphate with dilute nitric acid. It forms colourless crystals, melts at $233\text{--}234^\circ$, is sparingly soluble in water, readily in alcohol and in alkalies and acids.

Ethylapocinchinic acid, $\text{C}_{20}\text{H}_{19}\text{NO}_3$, crystallizes in anhydrous, yellowish needles melting at $161\text{--}162^\circ$, or in crystals containing 1 mol. of H_2O , and melting at $124\text{--}126^\circ$. It is sparingly soluble in water, readily in alcohol, and unites with both acids and bases. When heated with concentrated hydrochloric acid at 130° , it yields carbonic anhydride, ethyl chloride, and a substance melting at 187° , and resembling apocinchine in chemical behaviour.

Experiments made to replace the oxygen in apocinchine by

chlorine or amido-groups were unsuccessful. Apocinchine only suffers slight decomposition when heated with zinc-dust.

The authors consider that these and their earlier investigations show that apocinchine and cinchonine must contain a second benzene-group in addition to the quinoline-group; the oxygen in apocinchine would seem to be attached to this second benzene-group in the form of hydroxyl, as the compound exhibits decidedly phenolic characters. It is the hydroxylic hydrogen which is replaced in methyl- and ethyl-apocinchine. The reactions of these substances quite exclude the assumption that the alcohol radicles are in union with nitrogen.

Quinoline. A. Claus and T. Kramer. (*Ber. der deutsch. chem. Ges.*, xviii. 1243-1251.) This paper deals with various nitro- and amido-derivatives of quinoline. For particulars the original article should be consulted.

A New Diquinoline. O. W. Fischer. (*Monatsh. Chem.*, vi. 546-555.) In a previous communication (*Year-Book of Pharmacy*, 1885, 57), the author described the preparation of a diquinoline from benzidine by means of Skraup's reaction. On applying this reaction to diphenylene hydrochloride, a new diquinoline, $C_{18}H_{12}N_2$, is obtained. The pure base is deposited from alcohol in colourless plates melting at 148° . It is slightly soluble in water and ether.

The *hydrochloride*, $C_{18}H_{12}N_2 \cdot 2HCl$, crystallizes in slender needles; the *sulphate* forms white plates. Both these salts are freely soluble in water, but insoluble in alcohol. The *platinochloride*, $C_{18}H_{12}N_2 \cdot H_2PtCl_6 + H_2O$, is almost insoluble in hot water and hot hydrochloric acid. The *picrate* crystallizes in long needles of a yellow colour. It is very sparingly soluble in hot water and hot alcohol. It melts with decomposition at 268° . The *chromate* forms orange-coloured crystals, which are almost insoluble in water, but dissolve in dilute acids. The *methiodide*, $C_{18}H_{12}N_2 \cdot MeI$, crystallizes in pale yellow, silky needles, insoluble in absolute alcohol. The compound softens at 83° and melts at 126° .

Diquinoline forms a tetrabromo-additive product, $C_{18}H_{12}N_2Br_4$, and a dibromo-substitution product, $C_{18}H_{10}Br_2N_2$. The latter compound does not melt at 280° if perfectly pure.

Diquinoline-sulphonic acid, $C_{18}H_{10}N_2(SO_3H)_2$, crystallizes in four-sided plates. The barium salt crystallizes in needles with 3 mols. of H_2O . The salt is soluble in water, but insoluble in alcohol.

Isoquinoline. S. Hoogewerff and W. A. v. Dorp. (*Rec. Trav. Chim.*, iv. 125-129.) By adding concentrated sulphuric acid

to an alcoholic solution of the crude quinoline from coal-tar, the sulphates of quinoline and *isoquinoline*, C_9H_7N , are precipitated, and by repeated rectification of the free bases obtained from this precipitate two fractions are obtained, one boiling from $230-236^\circ$, which is chiefly quinoline, and the other boiling from $236-243^\circ$, containing *isoquinoline*: this is purified by the repeated recrystallization of its sulphate from alcohol. The free base melts at $18-23^\circ$, and boils at $236-237.5^\circ$ (uncorr.). The *sulphate*, $C_9H_7N.H_2SO_4$, forms hygroscopic prisms or tablets, and melts at $205-208^\circ$. The *chromate*, $(C_9H_7N)_2.H_2Cr_2O_7$, forms reddish-yellow needles, and is decomposed at about 150° . The *platinochloride*, $(C_9H_7N)_2.H_2PtCl_6 + 2H_2O$, forms slender, yellowish red needles; it becomes anhydrous at 110° . The *picrate* is but little soluble in alcohol or water, and crystallizes in yellow needles; it melts at $222-223.5^\circ$.

Synthetical Pyridine and Piperidine Bases. A. Ladenburg. (*Ber. der deutsch. chem. Ges.*, xviii. 1587-1590.) The author first corrects some erroneous statements previously made as to the bases obtained by distilling the additive compounds of pyridine with alkyl iodides. With regard to the two isomeric bases so obtained in each case, the base of lower boiling point yields picolinic acid only on oxidation, and therefore belongs to the α -series; whilst the base of higher boiling point yields isonicotic acid only, and must belong to the γ -series.

Pyridine propyl iodide and pyridine isopropyl iodide both yield the same bases on distillation. The α -base is not identical with conyryne, and is in all probability *α -isopropylpyridine*. It boils at $158-159.5^\circ$. The platinochloride crystallizes in monoclinic prisms, $a:b:c = 0.9769:1:1.3848$, and melts at $169-170^\circ$. The hydrobase boils at $159.5-160^\circ$; its hydrochloride melts at $208-210^\circ$, platinochloride at $193-193.5^\circ$, hydrobromide at $230-233^\circ$, hydriodide at $242-243^\circ$, and the cadmioiodide crystallizes in the monoclinic system, $a:b:c = 2.0289:1:1.0054$, and melts at $132-133^\circ$. The γ -base boils at $176-180^\circ$; its platinochloride melts at $203-204^\circ$.

Attempts to prepare α -allylpyridine from pyridine allyl iodide have not been successful, α -isopropylpyridine being formed in this case also.

Synthesis of Conine. A. Ladenburg. (*Ber. der deutsch. chem. Ges.*, xix. 439-441.) By heating a mixture of paraldehyde and α -picoline at about 250° , a small quantity of an oil of conyryne-like odour is obtained. This boils at $190-195^\circ$, is sparingly soluble in water, and on analysis gives numbers approximating to those

required for an allylpyridine, $C_5H_4N.C_3H_5$. On reduction, this substance gives a nearly quantitative yield of a base which seems to be identical with natural conine, inasmuch as it resembles it in appearance, solubility, and boiling point, and gives the characteristic double salt with cadmium iodide (m. p. 117–118°). The hydrochloride, however, melts at 203°, whilst conine hydrochloride melts at 210–211°; so that the question of identity is still not quite certain.

The Reactions of Hydrastine. A. B. Lyons. (*Druggists' Circular*, March, 1886.) Pure hydrastine dissolves in pure sulphuric acid to a solution which has only a very faint tinge of yellow. If the solution be heated, its colour changes to a deep blue-purple. If the sulphuric acid contains a trace of nitric acid, it produces a yellow solution. If the nitric acid be present in the proportion of 1 : 1000, the colour of the solution will be orange-red. If the nitric acid be in larger proportion, the solution will be first orange, then pale red.

Pure nitric acid produces an orange solution, the colour produced being quite permanent. On adding water there remains an insoluble residue, and the solution is found to have an intense blue fluorescence.

The action of oxidizing agents is particularly interesting. If the alkaloid is dissolved in concentrated sulphuric acid and a little binoxide of manganese added, there is developed first an orange colour, which deepens to a rich cherry-red, passing through carmine to a yellowish shade of red, and then, after some time, as the acid absorbs moisture perhaps, changes rather suddenly to a pale orange yellow. The reaction is highly characteristic, and especially interesting in contrast with the behaviour towards the same reagents of berberine, which again strikingly simulates that of strychnine.

Berberine dissolves in sulphuric acid to a yellow solution. On adding binoxide of manganese, the yellow colour changes to violet, then to chocolate brown, finally gradually becomes orange-red. Strychnine produces a somewhat similar series of colour, but the initial colour is a vivid indigo, and the violet colour which succeeds passes immediately into red, without becoming first brown.

Hydrastine gives, with concentrated sulphuric acid and iodate of barium or iodic acid, first an orange colour, passing rapidly into crimson, then blood red, fading quickly to dull orange. After a little time iodine separates and the solution becomes orange-red. If the acid is not of full strength, the colours are not so intense and do not succeed one another with the same rapidity. If equal

volumes of sulphuric acid and water are used, the colours are not developed, at least for some time.

If bichromate of potassium is employed as the oxidizing agent, similar colours are produced, but less intense, the succession being brownish red, yellow, or yellowish green.

Potassium permanganate brings out the colours finely, in the same order as binomanganate, but more evanescent. Sometimes there is produced after the characteristic red colour a violet, reversing the order of succession observed in the case of strychnine. A very careful comparison should be made of the colour reactions of strychnine, gelseminine, hydrastine, and berberine by any one who has occasion to make toxicological investigations.

Solutions of hydrastine are precipitated by potassium bichromate. If the precipitate is touched with concentrated sulphuric acid, it becomes instantly bright red, the colour fading in a few seconds. This reaction sharply discriminates hydrastine from either strychnine or gelseminine.

Sulphomolybdic acid produces with hydrastine a sage green colour, slowly changing to a brownish hue, and then gradually fading, a highly characteristic reaction.

Perhaps the most striking reaction of all, however, is that of solutions of hydrastine with potassium permanganate. If to the solution of hydrastine there is added a little dilute sulphuric acid, and then a few drops of a dilute solution of potassium permanganate (decinormal), the colour of the permanganate solution is instantly discharged, and there is developed in the solution an intense blue fluorescence. A single drop of a 1 per cent. solution of hydrastine is capable of rendering strongly fluorescent in this way a large test tube full of fluid.

If potassium permanganate is added in excess, the alkaloid is completely destroyed, and the fluorescent principle itself is further oxidized, so that the fluorescence disappears.

If hydrastine is digested with dilute sulphuric acid and binomanganate, there is produced a slight evolution of gas, and the solution becomes highly fluorescent. The action of nitric acid produces no doubt the same fluorescent oxidation-product.

If the fluorescent solution be shaken with chloroform, whether acid, neutral, or alkaline, it refuses to give up to that solvent the fluorescent substance. The excess of unchanged hydrastine, together with a substance not redissolved by acids, is, however, removed, and in this way the fluorescent body is partially purified. The author has not yet succeeded in completely isolating it, but he

finds it to be a substance soluble in alcohol, freely so in water, insoluble in ether and chloroform. The solutions containing it give precipitates indicating the presence of an alkaloid, but it is not yet certain that these reactions are due to the fluorescent substance itself. From *æsculine*, it is distinguished first by the circumstance that chloroform does not remove it from its acid solutions, and secondly by the fact that alkalies do not develop or increase its fluorescence.

It may be obtained in an impure condition by digesting hydrastine with binoxide of manganese and a slight excess of sulphuric acid, in water, adding ammonia in excess, filtering, evaporating the filtrate, exhausting the residue with ether and chloroform, and finally with absolute alcohol. It appears to be a somewhat unstable compound, readily decomposed or altered by heat, and by the action of reagents, but its properties can only be fully studied after it has been completely isolated.

The Fluorescent Principle of *Hydrastis Canadensis*. Prof. F. B. Power. (*Pharmaceutische Rundschau*, May, 1886.) The author's results, like those of Dr. Lyons's recent investigation, indicate that the fluorescence observed in solutions obtained from hydrastis, or occasionally in solutions of hydrastine itself, is due to an oxidation-product of the alkaloid hydrastine, and that it does not pertain to hydrastine itself, nor belong to an inherent proximate principle. The fluorescent substance is formed from hydrastine not only by the *limited* action of the ordinary oxidizing agents, but also evidently by most superficial oxidation, such as simple exposure of a solution of hydrastine to the air, or more readily when the solution is aided by the heat of a water-bath, as the above-mentioned experiments have shown. Why the solution of hydrastine in dilute sulphuric acid requires to be concentrated in order to develop the fluorescence, while the solution in hydrochloric acid requires to be diluted, seems difficult to explain.

Alkyl-Derivatives of Pilocarpine. P. Chastaing. (*Comptes Rendus*, ci. 507, 508; *Journ. Chem. Soc.*, 1885, 1250.)

Pilocarpine ethiodide, $C_{11}H_{16}N_2O_2 \cdot EtI$, is obtained by boiling pilocarpine with ethyl iodide. The excess of ethyl iodide is distilled off, the residue dissolved in absolute alcohol, and the solution concentrated by evaporation until the iodide crystallizes out. The crude product is dissolved in water, filtered from the excess of iodine which separates out, agitated with chloroform, and the aqueous solution then evaporated to dryness at a low temperature with as little exposure to light and air as possible. The residue

is dissolved in absolute alcohol, and the product allowed to crystallize. Pilocarpine ethiodide forms small, colourless, hygroscopic crystals, which melt at about 30° , and are insoluble in chloroform, but dissolve readily in water and in alcohol. The aqueous solution is not affected by hydrochloric acid, nor by a small quantity of ordinary nitric acid; but the fuming acid produces an immediate separation of iodine.

Pilocarpine ethobromide is prepared and purified in a similar manner. It is, however, very hygroscopic, and crystallizes with difficulty even when carefully dried.

Isoamyl-derivatives are not so easily obtained as the ethyl-derivatives.

Moniodopilocarpine ethiodide is formed by the action of ethyl iodide on moniodopilocarpine, or by the prolonged action of an alcoholic solution of iodine on crude pilocarpine ethiodide. It forms white, inodorous crystals, which become yellow when exposed to air and light. It is soluble in water, but insoluble in ether and chloroform.

Attempts to obtain dialkyl-derivatives by the prolonged action of ethyl chloride, bromide, or iodide, were unsuccessful.

Action of Chlorine and Iodine on Pilocarpine. P. Chastaing. (*Comptes Rendus*, c. 1593, 1594. From *Journ. Chem. Soc.*) When chlorine gas is passed into a well-cooled solution of pilocarpine in chloroform protected from light, the dichloride of dichloropilocarpine hydrochloride, $C_{11}H_{14}Cl_2N_2O_2 \cdot HCl \cdot Cl_2$, is obtained. It forms a soft, transparent resin, which changes to lamellar crystals when left over quicklime for some weeks. These crystals have the composition $C_{11}H_{14}Cl_2N_2O_2 \cdot HCl$, and when treated with silver oxide they yield the liquid, feebly alkaline base, $C_{11}H_{14}Cl_2N_2O_2$. When chlorine acts on pilocarpine in presence of moisture, a base, $C_{10}H_{14}Cl_2N_2O_2$, is obtained. The action of light complicates the reaction, and brings about the formation of secondary products.

When a chloroform solution of pilocarpine is mixed with a solution of iodine in chloroform, the colour of the iodine disappears, and if the chloroform is evaporated, and the liquid kept in a vacuum over soda-lime, part of the excess of iodine is volatilized, and on treating the residue with silver oxide in presence of chloroform, a base of the composition $C_{11}H_{15}IN_2O_2$ is obtained. No di-iodopilocarpine is formed under these conditions. When a solution of pilocarpine in chloroform is agitated in presence of light with an aqueous solution of iodine in potassium iodide, no substitution-product is formed.

Sparteine and its Salts. A. Houdé. (*Journ. de Pharm.* [5], xiii. 39-41.) The leaves and branches of *Spartium scoparium* are lixiviated with alcohol at 60°, until the washings cease to give a precipitate with iodated potassium iodide. The alcoholic solution is distilled under diminished pressure at a low temperature, and the residue is taken up with a solution of tartaric acid. After filtration, the solution is rendered alkaline by means of potassium carbonate, and is agitated with ether. Fresh tartaric acid solution is added, the sparteine again set free by alkali, and taken up by ether; and this treatment is repeated until a colourless, ethereal solution is obtained, which yields pure sparteine when evaporated without exposure to air or light. A kilogram of plant yields about 3 grams of the pure product. Sparteine is a colourless liquid, boiling at 287°. It is soluble in alcohol, ether, and chloroform, but insoluble in benzene and petroleum. It gives abundant white fumes in presence of hydrochloric acid. It is a tertiary diamine. Easily crystallizable salts are obtained by combining it with acids. Potash and ammonia give a white precipitate with a solution of the sulphate; this precipitate is insoluble in excess; hydrogen carbonate produces no precipitate in the cold, but when heated a whitish deposit forms. Concentrated hydrochloric, nitric, or sulphuric acids produce no coloration with the alkaloid. Cadmium iodide gives a white curdy precipitate. Sodium phosphomolybdate gives a white precipitate, soluble on heating. Copper salts give a greenish precipitate, platinum chloride gives a yellow crystalline precipitate.

Lupanine. M. Hagen. (*Liebig's Annalen*, ccxxx. Part 3; *Chemical News*, liii. 37.) Lupanine is an alkaloid obtained from the seeds of *Lupinus angustifolius*. It is obtained as a syrup of the consistence of honey, of a pale yellow colour with a green fluorescence. It has a strong alkaline reaction, an intensely bitter taste, and an unpleasant odour, like that of hemlock. The alkaloid forms, with hydrochloric acid, white clouds, like ammonia. It expels ammonia from its salts. In an excess of cold water it forms a turbid solution, and is almost entirely deposited on the application of heat. It dissolves with difficulty in cold alcohol, but readily in ether and chloroform. Baumert's lupanine (from *Lupinus luteus*) and lupinidine do not occur in *L. angustifolius*. The seeds of this latter species contain no other alkaloid than lupanine, $C_{15}H_{25}N_2O$, a monacid tertiary amine.

Adenine. A. Kossel. (*Ber. der deutsch. chem. Ges.*, xviii. 1928-1930.) The author has previously described this base as

occurring in animal tissues and yeast. When treated with nitrous acid, adenine is converted into hypoxanthine, to which it must therefore stand in the same relation as guanine does to xanthine. When heated with dilute acids, adenine is slowly decomposed; the products are under investigation. Adenine seems to be one of the decomposition-products of nuclein, and is probably an intermediate product in the formation of hypoxanthine from nuclein; it occurs in the extracts of most animal and vegetable tissues. When nuclein is heated with dilute sulphuric acid, small quantities of adenine are formed.

Conessine. K. Polstorff and P. Schirmer. (*Ber. der deutsch. chem. Ges.*, 1886, No. 1.) Conessine, $C_{12}H_{20}N$, crystallizes in slender, silky needles. When dried it forms a loose mass, of a dazzling whiteness, fusible at 121.5° . It is sparingly soluble in water, but very readily in alcohol, ether, chloroform, and benzol. Even a very dilute solution of its hydrochlorate gives a red-brown precipitate with an iodized solution of potassium iodide.

Euonymin. G. Romm. (*Chem. Centr.*, 1885, 442, 443). This glucoside is not to be confounded with the medical preparation of the same name, as the latter contains no poison, and is employed as an aperient. The author prepares it by extracting the powdered rinds of *Euonymus atropurpureus* with 70 per cent. alcohol, distilling and evaporating the extract, diluting with water and filtering; the filtrate is then precipitated by lead acetate, again filtered, and the clear liquor freed from lead by sulphuretted hydrogen. After neutralization with magnesium carbonate, precipitation with tannic acid, and treatment with zinc oxide, euonymin is obtained in crystals on evaporation of its ethereal solution. The bark of *Euonymus europæus* contains no euonymin.

Optical Properties of Cantharidine. E. Dietrich. (*Zeitschr. für Analyt. Chem.*, 1886, Part 2.) This compound is characterised by the phenomenon which it displays in the solid state in polarised light, especially when a drop of the solution in chloroform is allowed to evaporate, and the residue is examined with the polarising microscope. Its solutions have no effect upon polarised light.

A New Cumidine. W. Engel. (*Ber. der deutsch. chem. Ges.*, xviii. 2229–2233; *Journ. Chem. Soc.*, 1885, 1215.) Crude cumidine yields an *acetyl*-derivative which melts at 112° , from which a new *cumidine*, $C_9H_{13}N$, boiling at 223 – 224° , was obtained. The *hydrochloride*, *platinoclhoride*, and *nitrate* are described.

Cumenol, $C_6H_3Me_3OH$, is prepared by adding potassium

nitrite to a cooled, very dilute solution of cumidine in sulphuric acid, and then heating. It boils at $216-218^{\circ}$, and gives no colour reaction with ferric chloride.

Mononitracetcumidide, $\text{N O}_2 \cdot \text{C}_6 \text{H Me}_3 \cdot \text{N H } \bar{\text{A}}\text{c}$, is prepared by nitration of the acetyl-derivative above described. It crystallizes in dull yellow needles melting at 131° , and is very sparingly soluble in hot water, very readily in alcohol, less readily in ether.

Dinitracetcumidide, $\text{C}_6 \text{Me}_3 (\text{N O}_2)_2 \cdot \text{N H } \bar{\text{A}}\text{c}$, is prepared by the action of a large excess of fuming nitric acid on acetcumidide. It forms almost colourless needles, melts at 204° , and is insoluble in water, but soluble in ether and in alcohol. Concentrated hydrochloric acid acts on it with formation of a compound crystallizing in gold-coloured, slender needles melting at 78° . It is probably *dinitrocumidine*.

Monocumylcarbamide, $\text{C}_6 \text{H}_2 \text{Me}_3 \cdot \text{N H} \cdot \text{C O} \cdot \text{N H}_2$, is prepared by treating cumidine hydrochloride with potassium cyanate; it crystallizes in white needles insoluble in water, soluble in ether and alcohol, and decomposes at about 227° without melting, with evolution of ammonia and formation of *dicumylcarbamide*, $\text{C O} (\text{N H} \cdot \text{C}_6 \text{H}_2 \text{Me}_3)_2$. This compound forms white, silky needles which melt above 290° .

Dicumylthiocarbamide, $\text{C S} (\text{N H} \cdot \text{C}_6 \text{H}_2 \text{Me}_3)_2$, is prepared by treating cumidine with an excess of carbon bisulphide. It is insoluble in water, sparingly soluble in ether, but dissolves more readily in alcohol. It melts at 196° . Boiling water decomposes it; concentrated hydrochloric acid converts it into a cumyl isothiocyanate.

Alkaloids Produced by the Action of Ammonia on Glucose.
C. Tanret. (*Comptes Rendus*, c. 1540-1543; *Journ. Chem. Soc.*, 1885, 1047.) 60 parts of glucose were heated with 100 parts of ammonia of 25° in sealed tubes at 100° for thirty to forty hours. The blackish syrup thus obtained contains ammonium carbonate, a nitrogenous derivative described by P. Thénard, free ammonia, formic acid, and about 1.5 per cent. of alkaloids. To isolate the latter, the liquid is agitated with chloroform and the chloroform solution subsequently with dilute sulphuric acid, the crude products being further separated by fractional distillation.

The products are *α-glucosine*, $\text{C}_6 \text{H}_8 \text{N}_2$, which boils at 136° (sp. gr. at $0^{\circ} = 1.038$; vapour density, 3.81), and *β-glucosine*, $\text{C}_7 \text{H}_{10} \text{N}_2$, which boils at 160° (sp. gr. at $0^{\circ} = 1.012$; vapour-density, 3.87). Both the glucosines are colourless, very mobile, highly refractive, volatile liquids, with a powerful and peculiar odour. In acid

solutions they give precipitates with the ordinary reagents for alkaloids. They have a feebly alkaline reaction, and like caffeine, narcotine, and other weak bases, are removed from acid solutions by chloroform. They do not precipitate metallic oxides, but produce colour changes in solutions of copper and iron, and give a precipitate with mercuric chloride. When treated with dry hydrochloric acid, they form crystallized deliquescent hydrochlorides. With gold chloride they give canary-yellow precipitates of the composition $C_6 H_4 N_2 \cdot Au Cl_3$ and $C_7 H_{10} N_2 \cdot Au Cl_3$ respectively; and with platinic chloride they yield precipitates which form slowly, and the composition of which has not yet been determined. In warm solutions, a platinochloride seems to be formed, as in the case of pyridine bases. The glucosines combine with warm ethyl iodide to form blackish non-crystallizable products, which when decomposed by potash yield a highly basic, extremely unstable alkaloid, the composition of which could not be determined. In the cold the glucosines and ethyl iodide combine more slowly, in the proportion of equal molecules. When heated in sealed tubes at 100° , with hydrochloric acid or potash solution, they yield no ammonia, and when treated with sodium hypobromite no nitrogen is evolved. It would seem, therefore, that the glucosines are not amides. They are not affected by nitrous acid, chromic acid, or mercuric oxide, but are oxidized by potassium permanganate in presence of sulphuric acid with evolution of carbonic anhydride and formation of ammonium sulphate. They are violently decomposed by nitric acid, with formation of nitrogen oxides, carbonic anhydride, hydrocyanic acid, and oxalic acid. When brought in contact with sodium, they become dark-coloured, and seem to resinify, but no gas is given off.

Alkaloidal substances are also produced by the action of compound ammonias and some of their salts on glucose.

Digitalin, Digitalein, and Digitin. (*Pharm. Zeitschr. für Russland*, xxiv. 561; *Amer. Journ. Pharm.*, December, 1885, 606, 607). Digitalis is exhausted with water, and the infusion is decolorized with animal charcoal, treated with acetate of lead, and filtered. The filtrate is then treated with a mixture of 12 parts of liquor plumbi subacetatis and 1 part of spirit of ammonia. The precipitate, consisting of oxide of lead and the glucosides of digitalis, is washed on a filter, then made into a soft paste with water, and sulphuretted hydrogen passed into it. It is again placed on a filter; the filtrate contains all of the digitalein; but digitin and

digitalin, being almost insoluble in water, remain on the filter together with the sulphide of lead. Chloroform dissolves the digitalin, and alcohol the digitin. Pure digitalin and digitin are obtained by evaporating the respective solutions. Picrotoxin and solanin are obtained in the same way, but are distinguished as follows:—

The picrotoxin precipitate is mucilaginous, acquiring on the addition of concentrated sulphuric acid a saffron-yellow colour.

The digitalin precipitate is gelatinous, and acquires a flesh colour on the addition of concentrated sulphuric acid.

The solanin precipitate is granular, and on the addition of concentrated sulphuric acid turns dark; if sugar is added it assumes a violet colour, gradually turning to blue.

A New Reaction of Digitalin. P. Lafon. (*Comptes Rendus*, c. 1463–1465; *Journ. Chem. Soc.*, 1885, 1014.) When a trace of digitalin is treated with a mixture of equal parts of pure sulphuric acid and alcohol, and then mixed with a drop of ferric chloride solution, a greenish blue coloration is developed and persists for some hours. Only a very small quantity of digitalin should be used, and this is moistened with a very small quantity of the acid and alcohol, gently heated until it acquires a slight yellow tint, and then mixed with one drop of dilute ferric chloride solution. The coloration becomes more intense on standing and cooling.

This reaction was given by samples of digitalin from five different French makers, but was not obtained with some samples of foreign origin, notably two prepared by Merck. The French samples gave a green coloration with concentrated hydrochloric acid, and a blackish brown coloration with concentrated sulphuric acid, whilst Merck's crystallized digitalin gave no coloration with the first, and a red coloration with the second reagent. The different samples of digitalin also differed to a marked extent in their solubility in chloroform, and, as Laborde and Duquesnel have recently shown, in their physiological action.

The above reaction is not given by any of the ordinary alkaloids or glucosides.

Daphnetin. O. Jung. (*Chem. Centr.*, 1886, 41, 42; *Journ. Chem. Soc.*, 1886, 558.) Daphnetin, melting at 254°, contains 5.38 per cent. of water, and hence differs from æsculetin. Daphnetin yields *monethyl*-, *diethyl*-, and *dimethyl-derivatives*, melting at 155°, 72°, and 116° respectively; hence it contains two hydroxyl-groups.

Monobromodiethyldaphnetin, $C_{13}H_{13}O_4Br$, melts at 115°, and by

treatment with alcoholic potash is converted into *diethylldaphnetilic acid*, $C_{13}H_{14}O_5$, melting at 154° . This acid combines with hydrogen, yielding *hydrodaphnetilic acid*.

Diethylldaphnetone, $C_{12}H_{14}O_3$, is formed by distilling the calcium salt of *diethylldaphnetilic acid* or by heating its silver salt at 308° ; it boils at 260° .

Diethylldaphnetin, when mixed with alcoholic soda and evaporated, yields a crystalline sodium salt, probably of *diethoxycoumaric acid*; when treated with methyl iodide, the ethyl salt of β -*triethylldaphnetic acid* is formed; the free acid melts at 193° , and is converted by nascent hydrogen into *triethoxyphenylpropionic acid* (*hydrotriethylldaphnetinic acid*), melting at 85° . α -*Triethylldaphnetic acid* is obtained by digesting *diethylldaphnetin* (1 mol.), potash (2 mols.), and ethyl iodide (2 mols.) in alcoholic solution at the ordinary temperature; after suitable purification it melts at 173° ; it is exceedingly readily changed to the β -acid.

Triethylldaphnetic acid, when oxidized with potassium permanganate yields *triethoxybenzoic acid*, $C_{13}H_{18}O_5$, m. p. 100.5° , and its aldehyde m. p. 70° . This acid is identical with the *triethylpyro-gallolcarboxylic acid* of Will and Albrecht.

From these reactions, it follows that *daphnetin* has the constitution—



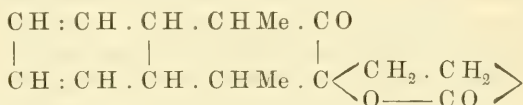
Opionin. O. Hesse. (*Liebig's Annalen*, ccxxviii. 299, 300; *Journ. Chem. Soc.*, 1885, 1074.) *Opionin* is contained in small quantities in *Smyrna opium*. It is obtained by treating opium with milk of lime at the ordinary temperature. The solution is slightly acidified with acetic acid, and evaporated until its volume is equal to that of the opium used. A brown mass is deposited, from which the *opionin* is extracted with ammonia, reprecipitated by acetic acid, and recrystallized from alcohol or ether. The substance forms white needle-shaped crystals which melt at 227° . It does not evolve ammonia when heated with soda-lime. *Opionin* is insoluble in water, but dissolves in alkalis. It is decomposed by boiling with milk of lime, an acid being formed which is freely soluble in water and ether. Lead acetate produces a bulky precipitate with the acid in alkaline solutions.

A second acid is formed by fusing *opionin* with potassium hydroxide. This substance is named *opionylic acid* by the author. It is deposited from ethereal solutions in thick prisms melting at

126°, and dissolves freely in water. With silver nitrate, a neutral solution gives an amorphous precipitate which soon becomes crystalline. It also yields a precipitate with lead acetate after the addition of ammonia.

Regianin and Juglone. T. L. Phipson. (*Chemical News*, lii. 39.) The author points out the identity of Mylius's juglone with regianin, extracted from fresh green walnut husks by himself in 1868. He suggests that the latter name should be retained, modified if necessary.

Constitution of Santonin. S. Cannizzaro. (*Ber. der deutsch. chem. Ges.*, xviii. 2746-2751.) After reviewing the evidence at present available as to the constitution of santonin, the author suggests the formula—



as agreeing fairly with its reactions.

Naringin. W. Will. (*Ber. der deutsch. chem. Ges.*, xviii. 1311-1325; *Journ. Chem. Soc.*, 1885, 906.) Analytical results obtained from naringin, and the properties of the substance, point to the probability of its being *methylhesperidin*, $\text{C}_{23}\text{H}_{28}\text{O}_{12}$, and not $\text{C}_{23}\text{H}_{26}\text{O}_{12}$, the formula assigned to it by Hofmann. When heated with dilute acids, it yields isodulcitol and *naringenin*.

Naringenin, $\text{C}_{17}\text{H}_{14}\text{O}_6$ ($= \text{C}_{23}\text{H}_{28}\text{O}_{12} - \text{C}_6\text{H}_{14}\text{O}_6$), forms colourless lustrous needles, without smell or taste, melting with decomposition at about 230°. It dissolves readily in alkalies, and is precipitated again by acids and by carbonic anhydride. It is readily soluble in alcohol, ether, and benzene. In all its reactions it resembles hesperidin. When boiled for five to six hours with aqueous potash, it splits up into phloroglucinol and *naringenic acid*, $\text{C}_{11}\text{H}_{10}\text{O}_4$. The latter compound melts at 207°; it is insoluble in light petroleum, sparingly soluble in benzene and in cold water, more soluble in hot water, and readily in alcohol and ether. It gives a yellowish red colour with ferric chloride. When heated with methyl iodide, potash, and methyl alcohol, it yields *methylic methylnaringenate*, $\text{C}_{13}\text{H}_{14}\text{O}_4$, crystallizing in lustrous plates melting at 68°. By boiling this methyl salt with potash, the potassium salt of an acid (methylnaringenic acid?) is formed, which when acidified yields an acid melting at 169°. This acid gives no colour with ferric chloride; when reduced, it yields a hydro-acid melting at 127°.

Derivatives of Quassin. V. Oliveri and A. Denaro. (*Gazzetta Chim. Ital.*, xv. 6-8; *Journ. Chem. Soc.*, 1885, 907.) The authors, in continuation of their investigations on quassin, $C_{32}H_{44}O_{10}$ (abstract, *Year-Book of Pharmacy*, 1885, 76), point out that by heating it in a current of dry air at 150° it can be converted, with loss of 1 mol. of H_2O , into an anhydride, *quasside*, $C_{32}H_{42}O_9$. If heated with acetic anhydride and sodium acetate, however, 2 mols. of H_2O are removed, with formation of a second anhydride, $C_{32}H_{40}O_8$, which forms a white, pearl-like, amorphous mass, soluble in alcohol, chloroform, and ether, and melts at $150-158^{\circ}$. Phosphorus pentachloride reacts violently with quassin to yield a *penta-chloro-derivative*, $C_{32}H_{39}O_8Cl_5$, a yellow powder, melting with decomposition at 119° ; it is probably derived from quassin by the substitution of two hydroxyl groupings and three hydrogen-atoms by chlorine.

The Solubility of Salicin. D. B. Dott. (*Pharm. Journ.*, 3rd series, xvi. 621, 622.) The author's results are summarized in the following table:—

Solubility of Salicin in Water.

$^{\circ}C.$	1 part is soluble in 34.74 parts of water.			
6°	"	"	31.76	"
11°	"	"	29.40	"
15°	"	"	28.10	"
29°	"	"	21.00	"
48°	"	"	11.50	"
56°	"	"	9.01	"
59°	"	"	7.66	"
65.5°	"	"	6.90	"
75°	"	"	3.82	"
82.5°	"	"	2.12	"
88°	"	"	1.31	"
90°	"	"	1.25	"
95°	"	"	1.17	"
102°	"	"	0.68	"

Saponin from Saponaria Officinalis. M. C. Schiaparelli. (*Analyst*, August, 1885; from *Bull. de la Soc. Chim.*) The saponaria root having been treated with alcohol, 90 per cent., and the alcoholic fluid allowed to stand in a cool place, a flocculent yellow substance is deposited on the sides of the vessel. This substance is washed with alcohol and digested with a mixture of alcohol and ether, to remove colouring matter.

It is very difficult to obtain saponin perfectly free from mineral substances, but this can be done by treating it successively with

alcohol and hydrate of barium, and separating the barium by means of sulphuric acid.

The saponin thus obtained is recovered by solution in water; it is then precipitated by alcohol and ether, and again recovered by a sufficient quantity of alcohol. On evaporation *in vacuo*, the alcoholic solution deposits white flocks of pure saponin. These are washed with ether and dried *in vacuo* over sulphuric acid.

Analysis gives results similar to the formula suggested by Rochleder, $C_{32}H_{54}O_{18}$.

Saponin is a very white amorphous powder, which provokes sneezing. It is poisonous; soluble in water, slightly soluble in alcohol; insoluble in ether, benzene, and chloroform.

Aqueous solutions of saponin possess the curious property of dissolving salts insoluble in water (PbS , $BaSO_4$, etc.). It is precipitated by acetate of lead and ammonio-nitrate of silver. Saponin is levogyrate. Saponite of barium is a white amorphous powder, the formula of which is probably $(C_{32}H_{54}O_{18})_3Ba_2$.

Saponin heated on a water-bath with dilute acids separates into glucose and a crystalline substance, *Saponetin*, $C_{40}H_{69}O_{15}$, insoluble in water and in ether, but soluble in alcohol.

Constituents of Commercial Saponin. Dr. R. Kobert. (*Pharm. Post*, October 24, 1885, 1151; *Pharm. Journ.*, 3rd series, xvi. 366.) According to the author, most commercial samples of saponin consist of a mixture of at least four organic and some inorganic substances. The pure saponin ($C_{13}H_{30}O_{10}$) is said to be perfectly inert, and not the source of the toxic property attributed to commercial saponin. A second constituent is lactosin, a carbohydrate discovered by A. Meyer, and also inert. The third and fourth constituents, which the author has named quillaic acid and sapotoxin, are very poisonous, and to them is due the acrid taste of saponin. In preparing quillaic acid from quillaia bark, a decoction is precipitated with neutral lead acetate. After removal of lead from the well-washed precipitate and evaporating, the residue is taken up with absolute alcohol, the filtrate evaporated, and this residue taken up with a mixture of five parts of chloroform and one of alcohol, which separates much colouring matter. From the filtered solution ether precipitates quillaic acid in snow-white flocks, which should be dried over sulphuric acid. The acid and its neutral salts are so toxic as to be fatal to dogs when administered subcutaneously in doses of 0.5 gram per kilogram of body weight, or by the mouth in four times that proportion. Analysis gave figures corresponding with the formula attributed to saponin,

and since quillaic acid loses its toxic properties through boiling it with baryta solution to dryness a few times, the author thinks saponin may be an inactive modification of quillaic acid.

Cupreol and Cinchol. Dr. O. Hesse. (*Liebig's Annalen*, cccxxviii. 288–298.) *Cupreol and cinchol* are isomeric compounds of the formula $C_{20}H_{34}O$, which were isolated by the author, the former from cuprea bark, the latter from different cinchona barks. In addition to cinchol, the bark of *C. Ledgeriana* contains also the isomeric *quebrachol*. These three compounds, as well as *phytosterin*, isolated by him from Calabar beans and from peas, belong to the class of cholesterins. The above new compounds were prepared from the coarsely powdered barks (20 to 25 kilos being used) by exhausting with petroleum benzin, treating the extract with boiling alcohol, cooling to separate greenish resin, concentrating between 40 and 60° C. until resin began to separate, then evaporating the clear liquid spontaneously, and separating the oily matter by means of bibulous paper, or by saponification with potassa. From 0·002 to 0·003 per cent. of cupreol was obtained from cuprea bark; and it was also found besides cinchol in the bark of *C. officinalis* and *C. Calisaya* var. *Schuhkrafft*.

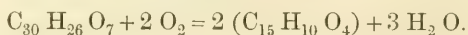
Cupreol crystallizes from alcohol or glacial acetic acid in colourless satiny scales, which on exposure become dull glossy. It is insoluble in water and alkalis, freely soluble in chloroform, ether, and hot alcohol, and less freely soluble in petroleum benzin and cold alcohol. Its chloroformic solution, like the solutions of *quebrachol*, *cholesterin*, and *phytosterin*, on being agitated with sulphuric acid, sp. gr. 1·76, acquires a blood red colour. The scales contain 5·93 per cent. (1 mol.) of water, which they begin to lose at 15° C. Cupreol melts at 140° C., volatilizes at a higher temperature, crystallizes from petroleum benzin or ether in anhydrous long needles; and when heated with acetic or propionic anhydrides, yields the corresponding crystalline ethers.

Cinchol crystallizes with 1 H_2O in needle-shaped scales or in broad lamina, melts at 139° C., is somewhat less strongly lævogyrate, and otherwise resembles cupreol.

The author examined also Kerner's cinchoerotin, from which cinchol and acetyl cinchol were prepared, differing from the preceding merely in having a slightly lower melting point.

The Active Principle of Goa Powder. A. Petit. (*Analyst*, November, 1885, from *Journ. de Pharm. et de Chim.*) According to Liebermann and Seidler, the active principle of goa powder is not chrysophanic acid, but chrysarobin. This substance, of which the

formula is $C_{30}H_{26}O_7$, is prepared by exhausting goa-powder with boiling benzene; on cooling, the chrysarobin is deposited as a pale yellow powder, which is purified by repeated crystallizations with acetic acid. Chrysarobin dissolved in solution of potash, and treated by a current of air, becomes wholly changed into chrysophanic acid, thus,—



The acid thus formed is precipitated by hydrochloric acid, and the precipitate having been washed and dried, is exhausted in a displacement apparatus with petroleum-ether, from which on cooling the acid is deposited in beautiful yellow scales. Chrysophanic acid crystallizes in yellow prisms, fuses at 152° , is insoluble in water, soluble in 224 parts of boiling alcohol at 86° , and in 1125 of alcohol at 30° , soluble in benzene and in acetic acid. It is a feeble acid, soluble in alkalies; these, at a temperature of 195° , convert it into a substance which is analogous to purpurin, and which colours alum mordants a pomegranate red, and iron mordants a light greenish blue. Treated with acetic anhydride and acetate of sodium, it yields diacetyl-chrysophanic acid; with nitric acid, tetranitro-chrysophanic acid; with ammonia, a chrysophanamide. Chrysophanic acid is distinguished from chrysarobin by the following reactions:—

	Chrysophanic Acid.	Chrysarobin.
Concentrated Sulphuric Acid	. Red colour	. Yellow colour.
Fusion with Potash . . .	. Blue mass	. Brown mass.

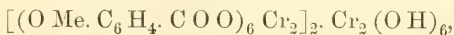
Chrysarobin is soluble in concentrated potash solution with pale green colour.

The Active Principle of Senna Leaves. R. Stockman. (*Pharm. Journ.*, 3rd series, xv. 749-751.) The active principle of senna is cathartic acid, and it must be extracted without the application of heat or of hydrogen sulphide. Leaves which have been extracted with alcohol are moistened with dilute sulphuric acid, then again extracted with alcohol, the alcoholic extract precipitated with baryta, the barium salt decomposed, the acid converted into the lead salt, and this precipitated from solution by addition of alcohol and ether. The lead and barium salts are amorphous, and are decomposed by water into acid and basic salts. Cathartic acid is tasteless. Sodium cathartate administered internally to a rabbit caused violent diarrhoea and death in three hours, by inflammation of the mucous membrane of the intestine; the urine gave a red coloration with potash. When injected it does not act, except on

the urine. When boiled with acids, cathartic acid yields a glucose and a yellowish resinous acid substance of purgative properties, soluble in ether, alcohol, and alkalies (with red colour); insoluble in water. Cathartic acid is also decomposed by potash.

Preparation of Anisic Acid. E. v. Meyer. (*Journ. Pract. Chem.* [2], xxxii. 429.) The method of preparing paramethoxybenzoic acid by the action of methyl iodide on parahydroxybenzoic acid is unsatisfactory. The author proposes to obtain it by acting on the potassium salt of the latter acid with potassium methyl sulphate. The potassium salt of parahydroxybenzoic acid is easily obtained by heating potassium salicylate to 220° , or by dissolving the acid in the requisite amount of potassium hydrate.

Anisates. G. Borrella. (*Gazzetta. Chim. Ital.*, xv. 304, 305.) The copper, manganese, nickel, cobalt, zinc, and cadmium salts of anisic acid, crystallize with H_2O ; there can also be obtained basic copper, $\text{O Me. C}_6\text{H}_4. \text{C O O Cu O H}$, and chromium,—



salts. In analysing the metallic salts of the organic acids, it is convenient to precipitate the heavy metals in the form of oxalates, the alcohol necessary for the complete precipitation serving to dissolve the liberated acid.

Decomposition of Tartaric Acid in the Presence of Glycerol. K. Jowanowitsch. (*Monatsh. Chem.*, vi. 467-476.) When a mixture of 8 parts of tartaric acid and 10 parts of glycerol is heated at 140° , large quantities of carbonic anhydride are evolved; at 180° a small quantity of acraldehyde is given off, and at a still higher temperature, $200\text{--}260^{\circ}$, a distillate is obtained containing pyruvic acid, acraldehyde, glycerol, and a crystalline substance, *glycidic pyruvate*. The latter dissolves very readily in water, alcohol, and benzene, etc.; it melts at 78° . When boiled with calcium carbonate, it yields glycerol, pyruvic acid, and carbonic anhydride; it is converted into lactic acid by the action of reducing agents.

The author intends continuing the examination of the substance.

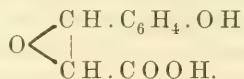
Salts of Salicylic Acid. H. Milone. (*Gazzetta Chim. Ital.*, xv. 219-228.) The *barium* salt, $(\text{C}_7\text{H}_5\text{O}_2)_2\text{Ba} + \text{H}_2\text{O}$, crystallizes in concentrically grouped silky needles, sparingly soluble in cold, more soluble in hot water. The *calcium* and *strontium* salts crystallize with $2\text{H}_2\text{O}$; the *magnesium* salt crystallizes with $4\text{H}_2\text{O}$, in silky needles; the *zinc* salt with $2\text{H}_2\text{O}$; the *cadmium* salt with $1\text{H}_2\text{O}$. The *manganese* salt forms pink crystals, containing

$2\text{H}_2\text{O}$, which rapidly turn brown with separation of manganese peroxide.

Action of Salicylaldehyde on Hippuric Acid. J. Plöchl and L. Wolfrum. (*Ber. der deutsch. Chem. Ges.*, xviii. 1183–1188.) When salicylaldehyde and hippuric acid are allowed to remain for some weeks with an excess of acetic anhydride, a condensation-product, $\text{C}_{32}\text{H}_{24}\text{O}_7\text{N}_2$ is formed, analogous to that already obtained by Plöchl from benzaldehyde and hippuric acid. The compound melts at 160° . By repeated crystallization from solvents containing water, such as ordinary alcohol, it successively takes up and eliminates the elements of water, yielding at last *benzoylimidocoumarin*. The same change is more conveniently effected by boiling for an hour with glacial acetic acid containing a few drops of strong hydrochloric acid.

Benzoylimidocoumarin, $\text{O} \begin{array}{c} \text{C}_6\text{H}_4 \cdot \text{CH} \\ | \\ -\text{CO} \cdot \text{CH} \end{array} \text{N Bz}$, melts without

decomposition at $170\text{--}171^\circ$. It is insoluble in water, but dissolves in warm ether, alcohol, benzene, and glacial acetic acid. It is attacked by dilute acids and alkalis only when heated, and then but slowly; by treatment with strong soda solution until no more ammonia is given off, it is converted into *salicylglycidic acid*,



This acid is sparingly soluble in cold, but readily in hot water, from which it crystallizes in flat needles or prisms; it is also readily soluble in alcohol and ether. It is not stable, and after a time gives on the one hand salicylaldehyde, and on the other its anhydride, *oxycoumarin*. With ferric chloride, it gives an intense green colour, a reaction shared by almost all glycidic compounds. *Calcium salicylglycidate* crystallizes in prisms with $6\text{H}_2\text{O}$, which become anhydrous at 100° .

Oxycoumarin, $\text{O} \begin{array}{c} \text{C}_6\text{H}_4 \cdot \text{CH} \\ | \\ -\text{CO} \cdot \text{CH} \end{array} \text{O}$, is formed by heating salicyl-

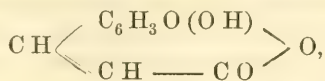
glycidic acid with dilute mineral acids. It melts without decomposition at $152\text{--}153^\circ$, is readily soluble in ether and in warm alcohol, and crystallizes from the latter in lustrous prisms. On boiling with water, it is reconverted into salicylglycidic acid, which on long standing again parts with water. By the action of dry

ammonia, an amide is formed, crystallizing in prisms. By the reduction of salicylglycidic acid *salicyllactic acid*, $C_9H_{10}O_4$, is obtained; it is an almost colourless syrup, soluble in water in all proportions. It closely resembles salicylglycollic acid. The *zinc salt* and *calcium salt* (with $6H_2O$) were prepared.

Action of Peroxide of Hydrogen upon Benzoic Acid in Presence of Sulphuric Acid. M. Hanriot. (*Comptes Rendus*, May 31, 1886.) This action is shown by the author to result in the formation of salicylic acid, along with a small quantity of another acid still under investigation. Cinnamic acid similarly treated yields benzoic acid.

Preparation of Trichloroacetic Acid. A. Clermont. (*Ann. de Chim. et de Phys.* [6], vi., 135-139.) One equivalent of chloral hydrate is melted at $50-55^\circ$; one equivalent of fuming nitric acid added, and the source of heat then removed; in a few minutes nitrous vapours are given off; the action ceases almost entirely in an hour's time. The liquid is then heated in a tubulated retort at $123-195^\circ$, whereby the whole of the nitric acid is removed; above 195° trichloroacetic acid distils as a colourless liquid, which solidifies on cooling.

Production of Hydroxycoumarin. D. Bizzarri. (*Gazzetta Chim. Ital.*, xv. 33-37; *Journ. Chem. Soc.*, 1885, 901.) As in the preparation of umbelliferone by von Pechmann and Welsh's synthetical method (abstract, *Year-Book of Pharmacy*, 1885, 79), not more than 50 per cent. of the theoretical yield is obtained, the author has improved the process for the extraction of the crude product of the reaction; the method proposed is given in detail. If catechol and malic acid are heated with concentrated sulphuric acid, a violent reaction occurs, and a substance may be extracted from the product of the reaction crystallizing in rose-coloured needles. It melts at $280-285^\circ$ with partial decomposition, and the analytical results agree with a formula of a metahydroxycoumarin,—

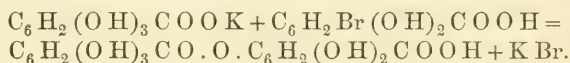


probably isomeric with the metahydroxycoumarin obtained by von Pechmann from quinol; the substituted groupings in the former are probably in the positions $[CH:CHCO.O:O:OH = 1:2:3]$, but in the latter in the positions 1:2:5. The metahydroxycoumarin is sparingly soluble in cold, easily soluble in hot water, alcohol, and acetic acid. It reduces salts of gold, copper, and

silver, and forms various red-coloured solutions with potash, and sulphuric and nitric acids.

Preparation of Vanillin from the Gum of the Olive Tree. A. Scheidel (*Dingl. polyt. Journ.*, cclviii. 240.) The author obtains this substance by oxidizing the gum of the olive tree. Olivil, obtained by recrystallizing the gum from alcohol, or its acetyl-derivative, $C_{14}H_{15}O_5Ac$, may also be employed.

Preliminary Note on the Synthesis of Tannin. B. Hunt. (*Journ. Soc. Chem. Ind.*, September, 1885.) It having been shown lately, by Böttinger and others, that Schiff's digallic acid differs from gallo-tannin, and is probably only isomeric with it, it occurred to the author that possibly gallo-tannin might be produced by the action of mono-bromo-protocatechuic acid on potassium gallate. The reaction may be represented thus—



The experiment was made as follows :—Mono-bromo-protocatechuic acid was prepared by the action of excess of bromine on protocatechuic acid in the cold (*Watt's Dictionary*, vi. 976). Potassium gallate, $(2C_7H_5KO_5.C_7H_6O_5 + H_2O)$, was prepared according to the directions given in *Watt's Dictionary*, ii. 761.

The bromo-protocatechuic acid and potassium gallate were cohobated together on the water-bath for about five hours, in presence of absolute alcohol, a slight excess of potassium gallate being used. The cold liquid was filtered through fine asbestos, and the alcohol evaporated off at a low temperature. The residue was dissolved in aqueous ether, and the solution filtered through asbestos. The ether was now evaporated off, and the residue dissolved in cold distilled water. The filtered, brown-coloured solution gave the following reactions :—It precipitated gelatin solution; it also precipitated cupric acetate solution, and the precipitate was insoluble in ammonium carbonate; it gave a precipitate with tartar emetic solution in presence of ammonium chloride, a black colour with ferric chloride, and, on standing some hours, a slight black precipitate; it reduced Fehling's solution readily on boiling, and formed a precipitate with cinchonine sulphate solution. The cinchonine precipitate was washed and carefully dried. The amount of cinchonine in it was determined by dissolving a weighed quantity in dilute sulphuric acid, boiling, and then precipitating the cinchonine in the cooled solution by a slight excess of caustic soda.

The result was 31·56 per cent. of cinchonine in the dry precipitate. $C_{20}H_{24}N_2O \cdot 2C_{14}H_{10}O_9$ gives 32·353 per cent. of cinchonine.

These reactions are identical with the reactions of gallo-tannin, and are not given by either gallic or protocatechuic acid, or a mixture of these acids. Further experiments are of course required to prove the identity of the substance produced with gallo-tannin.

Action of Picric Acid upon Oil of Turpentine. M. Lextreit. (*Journ. de Pharm.*, September 1, 1885.) If these substances are caused to react at about 150° , and if the clear liquid is then left to itself, crystals are deposited on cooling, in warty masses. If freed from the excess of picric acid and from a brown colouring-matter, these crystals appear in slender, transparent, brittle laminae; they are quickly affected by light, taking a pale yellowish orange colour, which gradually darkens. They are insoluble in water, sparingly soluble in cold alcohol. Ether and carbon disulphide dissolve them in abundance. If heated they melt, and are then decomposed with a slight deflagration. Picric acid behaves in the same manner with thymene.

A Decomposition-product of Oil of Turpentine. G. Bouchardat and J. Lafont. (*Comptes Rendus*, cii. 50; *Journ. Soc. Chem. Ind.*, 1886, 174.) 1,200 grams of oil of turpentine, carefully fractionated between 155 – 157° , were dissolved in an equal volume of glacial acetic acid, and treated with an acetic acid solution of 880 grams of crystallized chromic acid, the latter being slowly added to the solution of the oil maintained below a temperature of 40° . No CO_2 escaped, and although the larger portion of the oil was not oxidized, it nevertheless underwent a distinct change. A product, having the formula $C_{10}H_{16}$, and boiling at 174 – 178° , which the authors call lævorotatory terpene, was isolated. Its properties are entirely different from those of turpentine oil. Its smell recalls that of oil of lemons. This terpene contains about one-sixth of its weight of cymene, from which it could not be separated. Its rotatory power was found to be $(\alpha)_D = -56^\circ$, that of citrene being $+104.9^\circ$. The chemical properties of the two bodies are identical.

Action of Acetic Acid upon French Oil of Turpentine. G. Bouchardat and J. Lafont. (*Bull. de la Soc. Chim. de Paris*, March 20, 1886.) Acetic acid combines, even in the cold, with oil of turpentine, forming monoacetates belonging to two quite distinct series, terebenthenic and terpilenic; whilst the uncombined oil is transformed into two carbides, $C_{20}H_{16}$, the one monovalent, analogous to terebenthene, and the second bivalent, an active terpilene.

Terpinol. C. Tanret. (*Journ. de Pharm.* [5], xi. 506-510.) The author shows that the formula $(C_{20}H_{16})_2H_2O_2$, for terpinol, should be rejected; that true terpinol, which boils at $215-220^\circ$, is a monohydrate of terebenthene, $(C_{20}H_{16})H_2O_2$, and that the product obtained, either by the action of dilute acid on terpinol, or by the action of alcoholic potash on terebenthene dihydrochloride, is only a mixture of the hydrocarbon, $C_{20}H_{16}$, with this monohydrate.

Terpenes and Essential Oils. O. Wallach. (*Liebíg's Annalen*, ccxxx. Part 2.) In a further report on this subject, the author discusses borneol, camphene, the so-called "borneen," sylvestrene, Russian oil of turpentine, terpinol, terpinene, terpinolene, and terpineol. Borneol, melting at 206° , behaves in general like a saturated secondary alcohol, but it forms with bromine and with halogenous hydracids unstable double compounds. Camphene is formed directly from borneol by the action of dehydrating agents. Borneen is a mere mixture of the decomposition-products of camphene. The Swedish and the Russian oils of turpentine are identical in composition. They consist essentially of a mixture of pinene, sylvestrene, and dipentene, probably along with terpinene. The characteristic ingredients of both these oils is sylvestrene. Terpinol, as described by Wiggers and List, does not exist. Terpineol is a non-saturated monatomic alcohol. Terpinene has the same melting-point as dipentene, but yields, on bromination, liquid products. The author arranges the terpenes which he has examined in two parallel series, whose corresponding members agree in their boiling-points: (1) Pinene, sylvestrene, terpinene; (2) Camphene, limonene, dipentene, terpinolene.

Reduction of Camphor to Borneol. C. L. Jackson. (*Amer. Chem. Journ.*, vi. 404-407. *Journ. Chem. Soc.*, 1885, 991.) Im-mendorff's experiments (*Ber. der deutsch. chem. Ges.*, xvii. 1036) have confirmed the statements of the author and Menke, which had been disputed by Kachler and Spitzer (abstract *Year-Book of Pharmacy*, 1884, 114), that camphor is reduced to borneol if an alcoholic solution of the former is treated with sodium. Immen-dorff advised, however, the use of a larger proportion of sodium. The author has now repeated and substantially confirmed his former work with Menke, but finds that the best results are obtained by diminishing the quantity of alcohol used. The best yield of borneol (about 50-52 per cent. of the camphor acted on) is obtained as follows:—10 grams of camphor are dissolved in a beaker in 50 grams of common alcohol, and treated with 6 grams

of sodium cut into pieces of 0.1-0.2 gram. At first only two pieces of sodium should be added at a time, but after the fourth gram, a gram (cut in pieces as above) may be added at once. The liquid should be kept cool and frequently stirred, and a slow regular effervescence maintained. Towards the end of the reaction a drop or two of water may occasionally be added, to prevent the mass becoming pasty.

The author finds that, contrary to the statements of the textbooks, an alcoholic solution of camphor is reduced by sodium amalgam, although the action is too slow to be of practical value.

Borneol and Camphor. M. Lextreit. (*Journ. de Pharm.* [5], xiii. 265-267.) The author has shown (*Journ de Pharm.* [5], xii. 211) that thymene picrate, when treated with a boiling aqueous solution of soda, is decomposed with the formation of a white sublimate, similar in appearance to that obtained under the same circumstances from essence of terebenthene. The substance thus obtained has the formula $C_{10}H_{18}O$. It is lævorotatory, $[\alpha]_D = -37^\circ 21'$, when dissolved in alcohol of 92° , at a temperature of 22° . Its melting point is $200-201^\circ$. This lævo-borneol gives a lævo-camphor which fuses at 176° and boils at 204° , closely agreeing with dextro-camphor.

Motions of Camphor on the Surface of Water. T. Hart. (*Chemical News*, li. 277, 278.) The author suggests the following explanation of this phenomenon:—The cohesion of camphor being small, and its adhesion for water being great, camphor tends to spread itself over the surface of water; in doing so the particles are kept in constant motion, and they in their turn give motion to the mass. Experiments are adduced in support of this suggestion; and substances with similar properties—such, for instance, as colloidion—are observed to behave in a similar manner.

Motions of Camphor on the Surface of Water. C. Tomlinson. (*Chemical News*, lii. 50.) The author explained this and many similar phenomena several years ago. He attributes the motions of camphor on water to the surface tension of the liquid, and hence these motions can always be produced with pure materials and clean apparatus. Camphor rotates on dry mercury, and moves about on water even when supported on a small mica float; which facts set aside any explanations of the phenomenon depending either on disintegration by solution, or on adhesion for water.

Menthol. E. B. Kyle. (*Amer. Journ. of Pharm.*, Sept. 1885.) The author mentions the following among the properties of menthol. When thrown upon water currents are produced to

and from the dissolving crystals, similar to the motions observed under the same condition with camphor. Menthol liquefies with chloral, thymol, and camphor; and this action is particularly noticeable with thymol, crystals of the two substances placed in contact being in a few minutes transformed into a thick oily liquid. On gently heating a mixture of 1 drachm of the aqueous solution of menthol with half a drachm of a solution of 1 grain of iodine and 5 grains of potassium iodide in 2 drachms of water, with a small quantity of potash solution, the characteristic odour of iodoform is observed. The aqueous solution is not disturbed by ferric chloride or bromine water, but yields a slight turbidity with chlorine water. One grain of menthol yields, with 120 drops of sulphuric acid, a brownish red liquid of a very disagreeable odour, and on the addition of a little potassium bichromate becomes chrome-green, the colour remaining unaltered for several weeks. Menthol slightly warmed with nitric acid yields a thick, wine-coloured, oily liquid, and at a higher heat red fumes are given off; on neutralizing now with ammonia, a precipitate was observed which was soluble in alcohol, the solution, when evaporated, yielding an indistinctly crystalline mass.

Rosolene. M. Serrant. (*Comptes Rendus*, ci. 953; *Pharm. Journ.*, 3rd series, xvi. 446.) Among the products of the dry distillation of colophony, the oily-looking liquid that passes over at about 280° C. has been named "rosolene." It consists chiefly of the hydrocarbon retinol ($C_{16}H_{16}$), but contains also dissolved in it modified resin, terebene, cresylic and carbolic acids, creasote and similar bodies. The crude rosolene presents the appearance of a dark green or brown oil, and has a strong tarry odour. But after redistillation with a very weak solution of alkali, and treatment with finely powdered litharge, it resembles poppy-seed or sweet almond oil, being yellow or pale yellow, with a slightly peculiar taste, scarcely any odour, and a density of 0.950. It is insoluble in water and in alcohol, and soluble in ether, essential oils, and carbon bisulphide. It mixes perfectly in all proportions with fixed oils; but it is not saponifiable, does not turn rancid, and is always neutral. According to the author, rosolene possesses remarkable antiseptic, tonic, and cicatrizing properties, and when applied directly to wounds and suppurating surfaces, controls the suppuration and promotes a prompt and normal cicatrization. It is said that besides possessing special antiseptic properties, it is applicable to the same purpose as ordinary fats, oils, and paraffins, whilst it could be produced at much less cost. One purpose for

which it has been already employed successfully is as a substitute for fats and oils in the extraction of the perfumes of certain flowers, where its non-oxidizable properties are of advantage.

Derivatives of Phenol. G. Daccomo. (*Ber. der deutsch. chem. Ges.*, xviii. 1163-1169.) The derivatives described in this paper are: trichlorophenol, trichloronitro- and trichloramido-phenols, tribromonitro- and tribromamido-phenols. For details, reference should be made to the original article.

Cause of the Reddening of Carbolic Acid. A. Kremel. (*Chem. and Drugg.*, 1886, 460.) The author states that the red colour of carbolic acid is produced by a large number of metals and metallic oxides, particularly copper; and following it in degree of influence are lead, silver, and zinc, with or without the presence of ammonia. Tin appears to leave no action. These metals enter into combination, forming always the same organic compound, which dissolves in carbolic acid with a red colour, and in concentrated sulphuric acid with a blue colour. This compound is therefore not rosolic acid, which the sulphuric acid dissolves with a yellow colour.

Oxidation of Benzol. J. G. Holder. (*Amer. Chem. Journ.*, vii. 114-116.) When treated in the cold with manganese dioxide and sulphuric acid, benzol yields carbonic anhydride and a small quantity of benzoic acid; neither formic nor phthalic acid could be detected. By gradually adding sulphuric acid to benzol and lead dioxide, a vigorous reaction occurs, and carbonic anhydride and benzoic acids are formed; no succinic acid was observed. Potassium permanganate acts very slowly; lead dioxide and boiling dilute nitric acid yield only oxalic acid; chromic acid yields only carbonic anhydride.

Tribenzylamine. R. Leuckart. (*Ber. der deutsch. chem. Ges.* xviii. 2341-2344.) When benzaldehyde is heated with ammonium formate, tribenzylamine is formed, together with a nitrogenous, crystalline, indifferent substance, very sparingly soluble in the ordinary solvents, and a crystalline substance melting at 52°, and still under investigation.

Constitution of Thiophen. J. Thomsen. (*Ber. der deutsch. chem. Ges.*, xviii. 1832, 1833.) The author is led to consider from his researches on the heat of formation of thiophen, that the four carbon-atoms are united by five single bonds, and that it is probable that, like benzene, it will yield three bisubstitution-compounds.

Chlorophyll. E. Schunck. (*Proc. Royal Soc.*, xxxviii. 336-340.) It has long been known that the action of acids on chlorophyll produces both a change of colour and of absorption spectrum. Thus

if hydrochloric acid be passed into an alcoholic solution of this substance, a dark green precipitate is produced, which consists, according to Fremy's observations, of two colouring matters, phyllocyanin and phylloxanthin. These are best separated by solution in ether and the gradual addition of concentrated hydrochloric acid, which separates the liquid into two layers: a lower, blue, containing phyllocyanin; an upper, yellowish green, containing phylloxanthin. In this paper the properties and reactions of the former are described. It forms microscopic crystals, generally opaque and of an indigo colour, but olive-green and translucent when very thin. It may be heated to 160° without decomposition; it contains nitrogen, but no sulphur; is insoluble in water and petroleum, but soluble in alcohol, ether, and chloroform, a very minute trace imparting an intense colour to the solvent. Very dilute solutions give the absorption spectrum of the so-called "acid chlorophyll," consisting of five bands: three dark, one of moderate intensity, the fifth very faint. Phyllocyanin is far more permanent than chlorophyll; with oxidizing agents, it yields yellow amorphous products; with bromine, a grass-green solution. It dissolves in concentrated acid, yielding dark-blue solutions, showing spectra different from that of the original substance; it dissolves also in the alkalis, and the solution gives green precipitates with various metallic salts. When heated with aniline, it forms several products, one of which is colourless and crystalline; whilst another, possibly an anilide, gives a red solution with a characteristic absorption spectrum. Phyllocyanin apparently acts as a feeble base, uniting with strong acids to form unstable combinations; when dissolved in acetic acid in presence of various metallic oxides, compounds are formed containing the elements of the acid, the base, and phyllocyanin. These compounds are more or less soluble in alcohol, ether, and chloroform, but insoluble in water, with the exception of the manganese compound. The solutions are not precipitated by sulphuretted hydrogen. They also dissolve in dilute alkalis, but are reprecipitated on addition of acetic acid. These results probably explain the observations of Church and of Tschirch, who noticed that a chlorophyll solution, which had become brown on standing, gave a green solution when treated with zinc powder.

Constitution of the Albuminoids. A. Gautier. (*Bull. de la Soc. Chim.*, xliii. 596-602.) On coagulating a solution of 100 grams of egg albumen by heat, alkali sufficient to saturate 1.53 grams of $\text{H}_2\text{S O}_4$ is separated.

The purest albumen almost invariably yields about 0.5 per cent. of ash, which usually consists of sodium chloride and sulphate and calcium phosphate. It appears probable that these salts exist in the unaltered albumen as calcium chloride and sulphate and sodium phosphate.

A substance having all the characteristics of albumen may be prepared from blood fibrin, by digesting it with a solution of sodium chloride, and subsequently dialysing it. On examining the liquid from the dialyser, it is found that it contains soluble calcium salts, and it is therefore probable that the fibrin is transformed into albumen merely by the alteration of its salts.

Again, by diluting egg albumen with 10 volumes of water, and subsequently removing the excess of water, either by evaporation in a vacuum at 45°, or by congelation at a low temperature, an albumen is obtained containing exactly the same proportion of salts, water, and albuminous matter as the original egg albumen. But it has become so modified that it cannot be coagulated by heat, and may be acidified with nitric acid without being sensibly precipitated; but by passing several bubbles of carbonic anhydride through it, or by adding a drop or two of calcium chloride or sulphate solution, the albumen regains its normal properties.

From the above results, the author is led to believe that the modifications of albumen obtained by the action of heat, the addition of salts, etc., are chiefly due to alterations in the constitution of the small percentages of salts attached to the organic albuminous radical, although no doubt the dehydration of the albumen must also have a certain influence in these changes.

Formation of Aromatic Acids in the Fermentation of Proteids.

E. Salkowski. (*Zeitschr. für Physiol. Chem.*, ix. 491-510.) Of the aromatic acids resulting from the fermentation of proteids, phenylacetic or hydrocinnamic acid is invariably obtained, and frequently both. Their relative proportion is, however, variable. The following record of observations of the formation of the one or the other is given:—

Hydrocinnamic acid was obtained in: (1) 9 experiments with meat; duration of fermentation, 2-16 days. (2) 2 experiments with blood fibrin; duration of fermentation, 3-7 days. (3) 1 experiment with meat fibrin; duration of fermentation, 13 days. (4) 1 experiment with pancreas peptone; duration of fermentation, 7 days.

Phenylacetic acid was obtained in: (1) 3 experiments with serum albumen; duration of fermentation, 37-39 days. (2) 2 experiments with meat; duration of fermentation, 7-14 days.

In the case of one experiment with meat, both acids were isolated.

Preparation of Pure Albumen from Blood. J. E. Johansson. (*Zeitschr. für Physiol. Chem.*, ix. 310-318.) The serum is saturated with magnesium sulphate at 30°, allowed to cool, filtered, and the albumen then precipitated by adding acetic acid. The precipitate is redissolved and again precipitated by acetic acid in presence of magnesium sulphate. It is then redissolved in water, and the solution, after neutralizing, submitted to dialysis. Finally, the albumen is separated by precipitation with alcohol.

The Albuminoids of Milk. A. Dogiel. (*Zeitschr. für Physiol. Chem.*, ix. 591.) The author confirms Schmidt-Mülheim's observation that, in addition to casein and other proteids, milk contains small quantities of peptones.

Decomposition and Fermentation of Milk. Dr. F. Hueppe. (*Pharm. Journ.*, 3rd series, xvi. 590.) The author, who has paid great attention to this subject, describes five distinct organisms which he finds to be invariable accompaniments of lactic fermentation. One of these he isolated on nutrient gelatine in the form of white, shining, flat, minute beads. This organism has the power of transforming milk-sugar and other saccharoses into lactic acid, with evolution of carbonic acid gas. It is rarely found in the saliva or mucilage of the teeth. In these are two micrococci, both of which cause the production of lactic acid, but which manifest differences in their development under cultivation. There are also two pigment-forming bacteria, *Micrococcus prodigiosus*, which produces intensely red spots, and the yellow micrococcus of osteomyelitis. These five bacteria are so different and so constant in their properties, that they must, in the author's opinion, be regarded as distinct species. In addition to them, there is in milk an organism resembling *Mycoderma aceti*, which transforms milk-sugar into gluconic acid.

Analysis of Liebig's Extract of Beef. R. Sendtner. (*Zeitschr. für Analyt. Chem.*, 1885, 292.) Genuine Liebig's extract of beef should yield:—

Ash	.	.	.	.	.	.	22-25 per cent.
Water	.	.	.	.	.	.	16-21 „
Alcoholic Extract	.	.	.	.	.	.	56-65 „

Valuation of Pepsin. O. Schlickum. (*Analyst*, August, 1885.) The author recommends for this purpose the conversion of albumen into peptone. An egg is placed in boiling water for five

minutes, and rapidly cooled by cold water; the albumen will be hard, the yolk semi-liquid. Cut the albumen into very fine pieces, and rub through a fine sieve. Of this albumen put 10 grams into a solution of 0.1 gram of pepsin in 150 c.c. of water, add 2.5 grams of HCl, and keep the mixture at a temperature of 40° C. by means of a water-bath. On being dissolved, the albumen is transformed first into hemi-albumose, and afterwards into peptone. Digest for twelve hours, then filter, and to 10 c.c. of the filtrate add, drop by drop, 1 c.c. of HNO_3 , which should not cause more than a slight opalescence.

Nature and Action of Papain. S. H. C. Martin. (*Journ. Physiol.*, v. 213-230, and vi. 336-360; *Journ. Chem. Soc.*, 1886, 641, 642.) In the first of these papers papain is shown to be a proteolytic ferment, which acts very similarly to trypsin. Experiments performed with fibrin and coagulated white of egg showed that some degree of digestion occurs when the liquid is faintly acid (0.05 per cent. of HCl); the presence of more acid than this hinders the action of the ferment. Digestion takes place actively only in neutral or in alkaline solutions (0.25 per cent. of sodium carbonate); it occurs most readily at a temperature between 35° and 40°. The results of digestion are peptones, leucine, and tyrosine, and an intermediate globulin-like substance, similar to that formed in pancreatic digestion.

In the author's second paper on the same subject the ferment in papaw juice is shown to be associated with an albumose, and to give the following reactions in addition to those previously described by Wurtz:—The solution gives a biuret reaction, and it is precipitated from a neutral solution by sodium magnesium sulphate, the precipitate still being active. It is not precipitated by magnesium sulphate or sodium chloride alone, as globulins are. It is soluble in glycerol, and if precipitated from this solution by alcohol, the filtrate has no proteolytic power. The kind of albumose is one nearly akin to the protalbumose of Kühne and Chittenden, and is called α -phytalbumose. Papaw juice also contains a milk-curdling ferment.

The proteids present in papaw juice were found to be as follows:—

(1) Globulin, resembling serum globulin in its most important properties.

(2) Albumen.

(3) β -Phytalbumose precipitated almost completely by heat, by saturation with neutral salts, but not by dialysis. It differs

from the heteroalbumose of Kühne and Chittenden by not being precipitated by dialysis, by copper sulphate, or by mercuric chloride.

(4) α -Phytalbumose; soluble in cold or boiling water; not precipitated by saturation with neutral salts, except in an acid solution. This is the vegetable peptone referred to by Vines (*Journ. Physiol.*, iii.) as hemialbumose. It differs from the protoalbumose of Kühne and Chittenden by its non-precipitation by sodium chloride or by copper sulphate. Both these albumoses give the biuret reaction.

No peptones occur in the juice, but leucine and tyrosine are present.

By a series of digestion experiments carried out on each of these proteids by papain in a neutral liquid, it was found that both the globulin and albumen are changed into β -phytalbumose, and that this becomes a peptone-like substance, and forms leucine and tyrosine. The α -phytalbumose becomes a similar peptone-like substance, leucine and tyrosine being formed. This peptone-like substance resembles the deutoalbumose of Kühne and Chittenden, except that a solution of it, when rendered acid by acetic acid in the presence of sodium chloride, does not become cloudy on warming. No true peptones are formed.

Probably digestion in the plant itself is very slow, as much more liquid was used in the experiments than is present in the juice. The albumose forms probably the circulating proteid in the plant.

Diastatic Action of Saliva. R. H. Chittenden and H. E. Smith. (*Chemical News*, liii. 109-111, 122-124, 137, 138, 147, 148, 161-163, 173-175; *Journ. Chem. Soc.*, 1886, 638.) For the purpose of testing the diastatic action of saliva quantitatively, a 1 or 2 per cent. solution of starch was exposed to the action of the saliva at 40° C. for half an hour, and the reducing substances formed were in all cases calculated as dextrose by Allihn's (*Zeitschr. für analyt. Chem.*, xxii. 248) method. The action of a ferment is not proportional to its amount until its solution is much diluted; when the dilution of the saliva is as 1 : 50 or 100, the diastatic action can be taken as a measure of the amount of ferment present. The normal alkalinity of 15 samples of saliva reckoned in terms of sodium carbonate was 0.097 per cent. When this is neutralized with 0.2 per cent. hydrochloric acid, its diastatic action is much increased, especially when the dilution is 1 : 50 or 100, but the difference is still pronounced when the dilution reaches 1 : 2,000. There appears,

however, to be no proportional relation between natural variations of alkalinity and diastatic action, although the addition of sodium carbonate to neutral saliva retards and finally stops the action of ptyalin in proportion to the amount added; this occurring especially readily in more dilute solutions. This is not due to simple dilution, but to the thereby diminished percentage of proteid matter, which in the less diluted saliva possibly combines with the carbonate; and such proteid compounds have no effect on the ferment. Neutral peptone, on the contrary, has a distinctly stimulating effect on the activity of neutral saliva; and when proportionate amounts of peptone and sodium carbonate are added, the destructive action of the latter is prevented, an alkaline proteid substance being probably formed. The influence of free acid and of acid proteid on the activity of ptyalin is important, in view of the rapid passage of the salivary secretions into the stomach. That gastric juice does destroy ptyalin has been shown by Langley (*Journ. Physiol.*, iii.); the present research was directed to determining quantitatively the particulars of such action; the tropæolin test being used for the detection of free acid. As a mean of eight determinations, 20 c.c. of neutralized saliva were found to contain proteids capable of combining with 7.74 c.c. of 0.1 per cent. hydrochloric acid, a result showing on comparison with similar experiments with peptones, either that the combining power for acid of saliva proteid and peptone is different, or that much acid is used up in reacting with the alkaline phosphates present in saliva. When the proteid matter present is saturated with acid, the saliva has greater diastatic power than when it is simply neutralized. Small percentages of acid peptone act similarly, but beyond a certain point (when the amount of combined acid is over 0.006 per cent.), acid proteids retard and finally destroy the action of the ferment. A minute trace of free acid in dilute saliva still further increases diastatic activity, but 0.003 per cent. of free hydrochloric acid stops it.

Ferric Peptonate. M. Robin. (*Comptes Rendus*, ci. 321, 322; *Journ. Chem. Soc.*, 1885, 1147.) A solution of peptone is mixed with a certain quantity of officinal ferric chloride, glycerol added, and then excess of ammonia. A precipitate of ferric hydrate is at first formed, but this redissolves in a slight excess of ammonia, yielding a clear transparent liquid, which is neutral to litmus-paper, and gives no reaction with potassium ferrocyanide or ferricyanide. If, however, the liquid is acidified with hydrochloric acid, the Prussian blue reaction is readily obtained, and the reaction is also

given by a mixture of ferric chloride with peptone to which no glycerol has been added. If either the peptone or the glycerol is omitted, a clear solution cannot be obtained on adding ammonia; moreover, the glycerol must be added before the ammonia.

The solution of ferric peptonate is perfectly dialysable, and the product can be mixed with blood or any alkaline substance without any decomposition taking place. 7 grams of the peptonate were administered to a dog through the rectum, potassium ferricyanide being administered through the stomach at the same time. The coagulated blood of the animal showed no blue coloration, but the colour was easily obtained on adding a few drops of hydrochloric acid to the urine.

Physiological Action of Potassium Chlorate. J. v. Mering. (*Chem. Centr.*, 1885, 249.) The author confirms Marchand's view that this salt converts the hæmoglobin in the blood into meta-hæmoglobin, thus rendering the blood useless for the process of respiration. This action is dependent on the amount of chloric acid present, which has just the same effect as the salt.

Assimilation of Fats. I. Munck. (*Zeitschr. für Physiol. Chem.*, ix, 568; *Journ. Chem. Soc.*, 1885, 1148.) This is a critical discussion of the recent paper of Landwehr's, in which, having described a peculiar animal gum contained in and easily isolated from the pancreas, and also formed by the action of bile upon mucin, he assigns to it, on account of its remarkable power of emulsifying fats, an important part in promoting their absorption in the intestines. This the author shows, on the evidence, to be over estimated. In the first case, the emulsifying power of the gastric juice has been overlooked. The presence of fat acids in the intestines, and their disappearance during the passage to the anus, which he maintains in opposition to Landwehr, he regards as normal to the digestive process. Landwehr's observations on his own incapacity for absorbing fat acids by intestinal digestion, not having been conducted quantitatively, cannot be regarded as disproving the results of the author's repeated experiments on the dog: further, they introduce the uncertain factor of individual idiosyncrasy. Moreover, the supply of fat acids in the mass, to the intestines, introduces a condition altogether abnormal. Landwehr's hypothesis of the liberation of fat acids, as a result of the putrefactive resolution of the intestines, has little weight against the positive evidence afforded by the researches of Grützner (*Arch. Ges. Physiol.*, xii. 285), and Cash (*Arch. Physiol.*, 1880, 32), on the saponification of the fats in gastric and pancreatic digestion. In regard to the

reactions of the intestines and their contents, the author cites evidence showing that the acid reaction obtains during a much greater length than is allowed by Landwehr, and therefore the emulsifying power of the animal gum is thus far inoperative; moreover, the absorption of non-emulsified fat is an established property of the lymph cells of the adenoid tissue of the intestine, and it is generally accepted that emulsification is not an essential preliminary to the absorption.

However sound, therefore, Landwehr's observations on the animal gum may be in themselves, they cannot be taken as materially affecting the position of fat absorption.

Influence of Bile, Bile Salts, and Bile Acids on Amylolytic and Proteolytic Action. R. H. Chittenden and G. W. Cummins. (*Amer. Chem. Journ.*, vii. 36-52.) In the first series of experiments the ferment used was a filtered and neutralized solution of saliva, and was allowed to act on a 1 per cent. starch solution for thirty minutes at 40°; the dextrose (and maltose) formed were estimated gravimetrically. The following results were obtained:—

Addition of *free* taurocholic or glycocholic acid (0.1 and 0.2 per cent. respectively) reduces the action to one-tenth. No marked effect is produced by addition of 0.5 per cent. of sodium glycocholate, but the same quantity of sodium taurocholate reduces the action to one-thirtieth. Fresh ox bile may be added to the extent of 20 per cent. without influencing the action; and it is therefore probable that the retarding action of the bile acids is counterbalanced by the presence of some other substance in the bile. The slight diastatic power of bile is not sufficient to account for the inactivity of the bile.

In the second series an extract of pig's stomach was allowed to act on blood fibrin; the insoluble fibrin was estimated. Addition of taurocholic acid and its sodium salt have a powerful retarding action; glycocholic acid and its salts, on the other hand, have none. More than 1 per cent. of bile also retards the action, and 20 per cent. stops it; hence the reflux of but a small quantity of bile into the stomach would be attended with decreased proteolytic action.

The proteolytic action of trypsin in neutral solution is increased by addition of 0.1 to 0.5 per cent. of sodium carbonate, but further additions rapidly decrease the action. Combined salicylic acid has a great reducing power, and free salicylic acid stops the action completely; hydrochloric acid acts even more energetically. In an ordinary digestive mixture, or even when albuminous matter is present only in limited quantity, the addition of hydrochloric or

salicylic acid to a neutral solution containing trypsin reduces its proteolytic action to a minimum before any free acid is present. The addition of bile, of sodium glycocholate, or taurocholate produces scarcely any retarding action, but free taurocholic acid exerts a marked influence.

Lactic Fermentation. Drs. Hueppe, Engling, Escherich, and Bang. (*Bied. Centr.*, xiv. Part 6.) Milk contains no chemical ferment forming lactic acid. The production of lactic acid is a true fermentation, due to *Bacillus lactis*. New milk does not contain the living bacillus, but its spores exist pre-formed in the milk-gland, and thus always arrive in the milk. *Bacillus lactis* is crobic, and in the absence of oxygen no lactic fermentation is possible. The mature bacillus perishes below 100°, but the spores are still capable of conversion into living rods unless exposed to 100° for forty minutes.

The Gum Ferment. J. Wiesner. (*Monatsh. Chem.*, vi. 592-619; *Journ. Chem. Soc.*, 1885, 1241.) Gum arabic contains a diastatic ferment which is also met with in nearly all the different varieties of gum, in mucilage, in linseed, etc., and in those plant tissues in which cellulose changes to gum. This ferment is incapable of decomposing glucosides. It does not convert proteids into peptones, nor has it an "inverting" action. It converts starch into dextrin and arabin or bassorin. The gum ferment may be detected by boiling the substance with orcinol and strong hydrochloric acid. A red coloration is produced; the liquid then turns violet, and deposits a blue precipitate, which is soluble in alcohol. The ferment is decomposed by boiling in water for one hour and a half. The presence of this ferment interferes with the conversion of starch into sugar by bacteria and by diastase. The conversion of cellulose into gum or mucilage in living plants appears to be due to this substance.

A New Test for the Detection of Albumen. Dr. Axenfeld. (*Chem. Zeit.*, 1885, No 32.) The liquid to be tested is slightly acidified with formic acid, and then mixed with a small quantity of a $\frac{1}{10}$ per cent. solution of auric chloride. Gas bubbles arise, and the solution assumes a rose colour; a further addition of Au Cl_3 gives a purple, bluish, or deep blue colour; and a large amount causes a blue flocculent precipitate, the liquid becoming clear like water.

Detection of Blood in Urine. A. Luchini. (*Schweiz. Wochenschrift für Pharm.*, 1885, 220.) A new, sure, and simple method by means of which the peculiar colour of blood is obtained is de-

scribed by the author as follows :—To 10 c.c. of urine, in a test-glass, add one drop of acetic acid and 3 c.c. of chloroform, and shake well. In the presence of blood the subsiding chloroform will show more or less of the red-blood tint, according to the quantity of blood present. The author experimented with solutions of blood, prepared by himself, and observed the reaction to be successful with a solution containing 3 drops of blood in 250 c.c. of water.

Titration of Urea by Liebig's Process. T. Pfeiffer. (*Zeitschr. für Analyt. Chem.*, xxiv. Part 3.) The author, in opposition to Pflüger, maintains that Rautenberg's modification of Liebig's process gives accurate results under all circumstances, if calcium carbonate is used as the neutralizing agent.

Critical and Experimental Study of the Knop-Hüfner Method of Determining Urea. C. Jacoby. (*Zeitschr. für Analyt. Chem.*, xxiv. 307–328; *Journ. Chem. Soc.* 1886, 104.) The author defends the hypobromite process against the objections of Arnold (see *Year-Book of Pharmacy*, 1883, 74,) and maintains that if the operations be carried out in a uniform way, the use of an empirical constant for calculating the nitrogen into urea will always give satisfactory results. Hüfner by using 5 c. c. of a 1 per cent. urea solution and 100 c. c. of Knop's original hypobromite reagent, obtained 354.3 c. c. of nitrogen (at 0° and 760 mm.) from 1 gram of urea. Using this constant, the author made a series of determinations with pure urea solutions, varying in strength from 0.666 to 3 per cent., by both the Liebig-Pflüger and the Knop-Hüfner methods, and found that the latter gave on the whole the smaller errors. These were in almost all cases errors of deficit, and the deficiency increased somewhat—though not proportionally—with the strength of the urea solution; whilst Liebig's method gave more irregular results, sometimes much above the truth. With normal urine, and also with that of fever patients, Liebig's method invariably gave higher numbers than Hüfner's, the difference being greatest with the pathological urine. With diabetic urine, containing 3 or 4 per cent. of sugar, Hüfner's method still gave the lower numbers, but with a specimen containing 6 per cent., the use of the constant 354.3 led to a result higher than that yielded by Liebig's process. Determinations by both methods in solutions of pure urea, to which varying quantities of grape-sugar had been added, showed that the amount of nitrogen liberated increases with increasing quantities of sugar, although with as much as 6 per cent. it did not reach its theoretical limit.

Substituting for the sugar 1 to 5 per cent. of ethylic acetoacetate (the presence of which in diabetic urine has been suspected), practically the theoretical quantity of nitrogen was obtained, instead of the usual deficiency of 8 per cent.; and with healthy urine, to which 1 per cent. of the ether had been added, the use of the theoretical constant 371.4 gave approximately the same results as the use of 354.3 in the absence of the ether. Liebig's method gave higher results, supporting the view that mercuric nitrate precipitates other substances from urine besides urea. The author recommends that 4 per cent. of the ether should be added to diabetic urine, and the constant 371.4 used in the calculation.

Finally, it is argued that the results of this method are affected only to an insignificant extent by the other nitrogenous constituents of urine, except albumen and ammonia salts, of which the former is easily removed, and the latter, even if it be not right to calculate it as urea (which is almost certainly formed in the system by the dehydration of ammonium carbonate), can be determined by Schlösing's or Schmiedeberg's method, and allowed for.

The Detection of Bile in Urine. C. Deubner. (*Amer. Journ. Pharm.*, 1885, 409.) The author has critically examined the tests for the detection of bile in urine, and obtained the best results with the methods proposed by Hilger and by Rosenbach. According to Hilger (*Archiv der Pharm.*, cxi. p. 385) the urine is moderately heated and rendered alkaline by barium hydrate; a small portion of the washed precipitate treated carefully with a few drops of concentrated nitric acid gives the well-known colour reactions, green, violet, blue.

Rosenbach recommends filtering the urine through white filter paper; this acquires a yellow or brown colour, which with a drop of nitric acid changes to yellowish red, the margin of the spot becoming violet and deep blue, while towards the centre the colour gradually changes to emerald green. The modification of this test recommended by the author consists in placing a few drops of the urine upon a porous plate of white clay, when the spot remaining will show the reaction plainly and for some time. The advantage of this modification is that very little of the material is sufficient for applying the test, and that errors arising from the decomposition of the paper by the acid are excluded.

Hæmatin and Bile Pigments. C. A. MacMunn. (*Journ. Physiol.*, xvi. 22-39; *Journ. Chem. Soc.*, 1886, 638.) An easy method of procuring hæmatin is as follows:—Blood clot is extracted with rectified spirit containing pure sulphuric acid (1 in

17), the solution filtered, diluted with an equal amount of water, and agitated with chloroform. The chloroform, which assumes a reddish brown colour, is separated, filtered, and washed with water to remove the acid. The chloroform is evaporated, when the hæmatin remains as a dark-brown pigment which dries up to a bluish black powder. If the chloroform solution is allowed to remain for a few hours, crystals of hæmatin, resembling in shape and colour those of hæmin, separate out.

The bile of carnivorous animals is free from absorption-bands; with the bile of the sheep and ox, however, a three- or four-banded spectrum is sometimes obtained; biliverdin is a bandless pigment, and these bands are due to the presence of another pigment, called cholo-hæmatin. It may be thus separated: An ethereal extract of bile is evaporated and the residue taken up with chloroform, which is washed in a separating funnel with water. On evaporating the chloroform, a dark-green pigment with musky smell is left. It is regarded as a hæmatin-derivative; its spectrum suggests a mixture of alkaline hæmatin and hæmochromogen, and it is probably an intermediate stage in the formation of biliverdin. In bile obtained from four cases of biliary fistula in man, the chromogen of a colouring matter very similar to febrile urobilin and stercobilin was found, also a small quantity of biliverdin, and the chromogen of biliverdin, but no bilirubin. Spectroscopic examination of urobilin and stercobilin in various solvents shows, however, that the two pigments are not identical.

Bile Acids. C. Schotten. (*Zeitschr. Physiol. Chem.*, x. 175-200.) Previous researches on the acids of human bile are as follows:—Jacobsen found ordinary cholic acid, glycocine, but no taurine. Hammarsten (*Maly's Jahresb.*, 1878, 263) states that the cholic acid of human bile differs from that of ox bile. Bayer (*Zeitschr. Physiol. Chem.*, ii. 358; iii. 292) confirms this, giving the formula of anthro-po-cholic acid as $C_{18}H_{28}O_4$; it differs from the cholic acid of ox bile in that its baryta salt is more insoluble.

The author, however, comes to the conclusion that the cholic acid from both sources is identical, and suggests that the apparently smaller solubility of the salts of the acid from human bile may be due to a slight admixture of choleates.

Cholic acid from ox bile crystallizes with $2\frac{1}{2}$ mols. of H_2O in ortho-rhombic forms, and not, as previously supposed, in quadratic crystals. The *methyl* salt, $C_{24}H_{39}O_5Me + MeOH$, crystallizes in large, lustrous plates, and melts at 110° , or after removal of the alcohol of crystallization, at 147° . The *ethyl* salt, $C_{24}H_{39}O_5Et$,

crystallizes in needles, melts at 158° , and does not seem to form crystalline compounds with alcohol. Cholic acid is monobasic, does not give acetyl or benzoyl compounds, and on dry distillation gives an anhydride, $C_{48}H_{66}O_3$; this is soluble in alkalis, the solutions when acidified yielding an amorphous acid.

On distilling cholic acid with lime or baryta, an oil which boils below 100° is obtained; this smells like turpentine, suggesting that cholic acid may contain an aromatic radicle. On feeding dogs with bile acids, however, no aromatic acids occur in the urine.

Detection of Morphine in Urine. MM. Notta and Lugan. (*Zeitschr. für. Analyt. Chem.*, 1886, Part 1.) The authors precipitate 1 litre of the sample with 100 c.c. of basic lead acetate, filter, and remove the excess of lead with sulphuric acid (1 : 10). The filtrate is supersaturated with ammonia, and shaken up for a few minutes with 100 c.c. of hot amylic alcohol. The latter is then drawn off by means of a pipette, and the morphine is transferred first to water acidulated with sulphuric acid, and from this again, after supersaturation with ammonia, to a fresh portion of amylic alcohol. The residue on evaporation is pure morphine, as may be found by the characteristic reactions.

Alkaloidal Constituents of Urines. A. Villiers. (*Bull. de la Soc. Chim.*, xliii. 550-552.) Alkaloids are not present in normal and healthy urine, but they are invariably to be found in urine passed by persons suffering even from slight indisposition. It is possible that if in disease these alkaloids are formed more rapidly than they are removed by the kidneys, that they may ultimately be the cause of death; and the author considers that the beneficial action of light drinks (tisanes) in illness may be due to the removal of these alkaloids.

Ptomaines and Leucomaines. A. Gautier. (*Journ. de Pharm.* [5], xiii., 354-360, and 401-409; *Journ. Chem. Soc.*, 1886, 634.) The author gives a *résumé* of the work done on these alkaloids. From the muscle of large animals he has succeeded in obtaining five new alkaloids (leucomaines), perfectly definite in composition and crystalline form, which, when administered to animals, act more or less powerfully on the nerve centres, inducing sleep, and in some cases causing vomiting and purging, in a manner similar to the alkaloids of snake poison, but less powerfully than the ptomaines. These bases are formed during life, and occur in the urine, saliva, venom, and various glandular secretions; but the author has more particularly studied their occurrence in muscle.

Xanthocreatinine, $C_5H_{10}N_4O$, is the most abundant of the bases

obtained from muscle. It consists of light sulphur-yellow spangles, with a slightly bitter taste. The crystals are very soluble in water and in hot alcohol. They slowly blue reddened litmus-paper, and redden the blue paper. The hydrochloride is obtainable. The platinochloride is very soluble, and crystallizes in long sheaves. The aurochloride is difficult to obtain in the crystalline form. The substance closely resembles creatinine. This resemblance, together with its yellow colour, is indicated in its name.

Crusocreatinine, $C_5H_8N_4O$, is decidedly alkaline to test-paper, and gives a soluble non-deliquescent hydrochloride, and a soluble platinochloride. The slightly soluble aurochloride occurs in crystalline grains. This base neither precipitates zinc from its acetate nor mercury from its nitrate, but it precipitates alumina from alum solutions. It strongly resembles creatinine.

Amphicreatinine, $C_9H_{19}N_7O_4$, occurs in small quantity only. It is a feeble base, forming a non-deliquescent crystalline hydrochloride. Its platinochloride is soluble in water, insoluble in alcohol, and forms lozenge-shaped plates. Its aurochloride form very soluble, microscopic, hexahedral, and tetrahedral crystals.

Pseudoxanthine, $C_4H_5N_5O$. The alcoholic mother-liquors from the preceding compounds are freed from alcohol, the residue is taken up with water, and treated with copper acetate in slight excess. On heating, a precipitate is obtained from which the copper is separated by means of sulphuretted hydrogen. On filtering the boiling solution, a light sulphur-yellow powder is obtained. This substance readily forms a very soluble hydrochloride. It is similar to xanthine, except that it is slightly more soluble, and there is a little difference in the crystalline form. The author has also obtained two other bases—of the composition $C_{11}H_{24}N_{10}O_5$, and $C_{12}H_{25}N_{11}O_5$, respectively—whose reactions show their close relation to creatinine. During the writing of this paper, Brieger has described a very poisonous leucomaine, of the composition $C_6H_{15}NO_2$, obtained from poisonous mussel, which he calls *mytilotoxine*.

An Alkaloid obtained from the Culture-Broths of Koch's Microbe. A. G. Pouchet. (*Comptes Rendus*, ci. 510, 511.) The pure cultivation broth of Koch's microbe has yielded to the author traces of a liquid alkaloid, which appears to be identical with that already isolated from the ejections of cholera patients.

Estimation of Oxalic Acid in Plants. MM. Berthelot and André. (*Comptes Rendus*, ci. 354-360; *Journ. Chem. Soc.*, 1885, 1164.) The plant is bruised in a mortar, boiled with water for

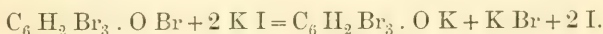
one hour, allowed to macerate for twenty-four hours, and the liquid decanted off and filtered. The residue is again extracted with warm water, and finally pressed. If it is required to extract the insoluble oxalates, the water used for maceration must be mixed with 20–30 c.c. of strong hydrochloric acid for each 100 grams of plant. The mixed filtrates are acidified with hydrochloric acid (if this has not been already added), boiled, and again filtered. The filtrate is made alkaline with ammonia and mixed with an excess of boric acid solution, which in presence of ammonium chloride prevents the precipitation of tartrates, racemates, citrates, etc., or redissolves these precipitates if already formed. The liquid is then strongly acidified with acetic acid, mixed with calcium acetate, heated below the boiling point for about an hour, and the impure calcium oxalate collected and washed. The precipitate is redissolved in hydrochloric acid, reprecipitated by ammonia, with subsequent addition of acetic acid, and again collected. This treatment is repeated if necessary, and the purified precipitate is finally weighed as such, converted into calcium sulphate, or treated with a large excess of sulphuric acid, and the evolved carbonic oxide measured.

The paper concludes with some determinations of the proportions of soluble and insoluble oxalates in different parts of *Chenopodium quinoa*, *Amarantus caudatus*, *Mesembryanthemum cristallinum* and *Rumex acetosa*.

A New Method for the Detection of Salicylic Acid. Professor Curtman. (*Pharm. Rundschau*, July, 1885, 153.) The author's method is based upon the formation of salicylate of methyl (oil of gaultheria). It consists in adding to a small quantity of the sample to be examined, contained in a test tube, about 1 c.c. of methyl alcohol, and then with great care about $\frac{1}{2}$ c.c. of concentrated sulphuric acid. After a short boiling the test tube is set on one side for a few minutes, and then heated again, when the odour of methyl salicylate is said to be clearly distinguishable if as much, for instance, as a milligram of sodium salicylate be present, especially if the liquid be poured from one tube to another. Ethylic alcohol also gives a characteristic odour, but requires longer digestion.

Titration of Phenol with Bromine. C. Weinreb and S. Bondi. (*Monatsh. Chem.*, vi. 506–510; *Journ. Chem. Soc.*, 1885, 1266.) Benedikt has pointed out (*Wien. Akad. Ber.*, 1879) that when a solution of phenol is mixed with an excess of bromine-water, tribromophenol bromide is formed, not tribromophenol, as stated by

Landolt (*Ber. der deutsch. chem. Ges.*, iv. 770). In Koppeschaar's method of estimating phenol (see *Year-Book of Pharmacy*, 1877, 121), an excess of bromine-water is added to the solution of phenol; potassium iodide is added to the mixture, and the amount of iodine liberated is estimated by means of a standard solution of sodium hyposulphite. The tribromophenol bromide is decomposed by the potassium iodide, yielding potassium bromide, iodine, and tribromophenol,—



Better results are obtained if a mixture of sodium bromide and bromate is substituted for bromine water. Although this method yields satisfactory results with pure phenol, it cannot be successfully applied to crude carboic acid or tar oils, as it is exceedingly difficult to completely extract the phenol from such oils by shaking with water. If the crude carboic acid is itself subjected to the action of bromine water, the bromine only acts on the surface of the oil globules.

Turmeric as an Indicator in the Titration of Citric Acid. F. Watts. (*Journ. Soc. Chem. Ind.*, 1885, 214.) A tincture of turmeric is prepared with strong spirit, drops of this are placed on a white tile, or better, in the depression of an ordinary colour slab. The liquid spreads out in bright yellow films; drops of the solution being tested are from time to time placed on these yellow films. As the addition of the alkali proceeds, the slightest excess of alkali causes the development of the well-known red-brown colour. This indicator can be used in the cold, and also works well in the analysis of concentrated lemon or lime-juice, the red-brown colour being readily seen, even in the presence of the dark liquids which have to be dealt with in these cases, in which the delicate pink of phenolphthalein (which has been recommended as an indicator of citric acid) is scarcely visible.

In order to test the delicacy of tincture of litmus as an indicator, the following experiment was made:—About three grains of citric acid were nearly neutralized with caustic soda and carbonate of barium added in excess: the mixture was boiled and filtered. The filtered and boiled solutions did not cause the development of a pink colour with phenolphthalein, neither did it change the colour of the yellow turmeric films; litmus paper, however, was turned decidedly blue by it.

A faint pink colour was developed in phenolphthalein by the addition of less than .0015 gram of Na O H, a strong pink colour

being caused by the addition of .0025 gram to the above solution.

With turmeric, a slight change was noticed when .0028 gram of NaOH had been added, and a decided change with .0042; this latter quantity produced a sufficiently deep red to have been noticeable with dark solutions. When this last solution was diluted to five times its volume (being originally 20 c.c.), the red-brown colour was still developed on adding a drop to a turmeric film. It will be seen that much greater certainty arises from the use of this indicator in the place of litmus.

In using this indicator, much time is saved by employing litmus paper to determine the near approach to neutralization, proceeding with the addition of the alkaline solution until the litmus paper is turned slightly blue, and determining the exact point of neutralization by means of the turmeric. In the case of unconcentrated lemon and lime juices, the change of colour of the juice when nearly neutralized renders the employment of litmus paper unnecessary.

Volumetric Estimation of Tannin. F. Jean. (*Bull. de la Soc. Chim.*, 1885, xliv. 183; *Journ. Soc. Chem. Ind.*, 1885, 179.) A circular piece of paper, .05 m. in diameter, is laid upon a piece of black cloth about 20 cm. square, and placed near a well-lighted window. Upon this a beaker is placed of 800 c.c. capacity, and .085 m. inside diameter, a volume of 200 c.c. being indicated by a mark. 5 c.c. of Fe_2Cl_6 solution are run into the beaker (the solution contains 14 grams of Fe_2Cl_6 and 10 c.c. of HCl in the litre), and to this .1 per cent. solution of tannin is added, drop by drop. After each addition, the liquid is quickly agitated with a glass rod, and observed as soon as the circular movement begins to cease. The operation is finished as soon as the white spot has become completely invisible, which occurs on the addition of 11.6 c.c. of tannin solution. It is therefore a very simple matter to estimate tannin in this way. It is only necessary to take the precaution of having the tannin solution to be tested of approximately 0.1 per cent. strength, and this is attained by using the following quantities with 100 c.c. of water: 1.5 gram European oak bark, 1 gram African bark, .5-.6 gram Quebracho, .4-.5 gram sumach, .25 gram catechu. The method allows of a determination to .5 per cent., and is completed in a few minutes. As gallic acid has not the same value for tanning as that precipitable by albumen, the analysis of this acid is of importance. A modification of the above process may be used. An aqueous extract of the raw material is made, so that

100 c.c. of water contain 2 grams of gallic acid. After diluting 50 to 100 c.c. with water, the quantity of Fe_2Cl_6 is determined necessary to produce complete opacity. In the remaining 50 c.c., 2 grams of scraped skin, previously softened in water and dried between linen, are added. After two hours, the liquid is filtered through linen washed with water, 10 c.c. of 1 per cent. solution of pure tannin added, and diluted to 100 c.c. with water. This liquid contains .1 grm. tannin and gallic acid, or other compounds not precipitable by tannin. The difference in volume of the 1 per cent. tannin solution and that of the solution to be determined gives the quantity of gallic acid.

A New Volumetric Process for the Estimation of Tannin. E. Durien. (*Annali di Chim. Med. Farm.*, December, 1885, 350; *Amer. Journ. of Pharm.*, 1886, 120.) The process recommended by the author is based upon the following reactions:—

1. That the addition of chloride of iron solution to one of tannin forms a black or green coloration; and,
2. That this coloration is destroyed, little by little, and then completely, on the addition of a solution of chlorinated lime.

The mode of operation, with the results obtained, is as follows: (1) Prepare a solution of calcium hypochlorite (10 grams) in distilled water (200 grams), and filter. (2) Make a second solution of pure tannin by this formula,—

Tannin, Pure	0.10 gram.
Official Solution of Ferric Chloride (containing 26 per cent. of Fe_2Cl_6)	15 drops.
Acid Acetic, Concentrated (glacial)	20 „
Distilled Water	20 c.c.

This solution is made in a 100 c.c. glass flask, and serves as a titrate to the first solution. With a Gay-Lussac burette, graduated to the one-tenth of a c.c., rapidly add, drop by drop, the hypochlorite, agitating after each addition, when the green or black colour of the liquid will gradually grow lighter and pass, suddenly, to a rose-brown, at which point the operation must be arrested. This rose-brown colour, by the action of the air, passes to a green, but there is no need of taking into calculation this secondary reaction. Working in this manner, it will be found that about 14 c.c. of solution of hypochlorite will be required to destroy the inky colour formed from 0.10 gram of pure tannin.

To fully establish the accuracy of his method, the author made various mixtures of sugar and pure tannin, in order to ascertain

what influence, if any, organic substances might have upon the results.

The following table gives the figures obtained:—

Substance.	Amount.	Sol. of Hypo-chlorite used	Tannin found.	Tannin calculated.	Difference.
Tannin, pure .	0·10 grm.	14 c.c.	—	—	—
Mixture A . .	0·15 „	10·5 c.c.	0·075 grm.	0·075 grm.	0·000 grm.
„ B . .	0·20 „	13·9 c.c.	0·099 „	0·100 „	0·001 „
„ C . .	0·30 „	20·8 c.c.	0·148 „	0·150 „	0·002 „

This series of analyses demonstrates that with this test a very good approximation may be made to the quantity of tannin present, and that sugar has no influence on the results. An assay of commercial tannin can thus be made in less than ten minutes.

Volumetric Determination of Acetic Acid and its Salts. C. O. Weber. (*Zeitschr. für Analyt. Chem.*, 1885, Part 4.) The author heats 10 grams of the acetate finely ground with a little water in a 50 c.c. flask, fills it up to the mark, and filters the liquid through a dry folded filter. 25 c.c. of this solution are mixed with 50 c.c. of absolute alcohol, and the acetic acid is precipitated with an alcoholic solution of silver nitrate. The precipitate of silver acetate is filtered, well-washed with 60 per cent. spirit, dissolved in hot dilute nitric acid, and titrated with decinormal sodium chloride. Each c.c. of this solution consumed represents 0·006 gram acetic acid monohydrate.

The New Pharmacopœia Test for the Purity of Ether. E. A. Werner. (*Pharm. Journ.*, 3rd series, xvi. 661.) The author refers to the property of many commercial samples of ether of liberating iodine from potassium iodide, as first observed by Dr. Warden (see *Year-Book of Pharmacy*, 1885, p. 35), and complains that this reaction has been made the basis of the official test for the purity of ether in the new Pharmacopœia. The liberation of iodine is not due to any actual impurity in the drug, but a result of its decomposition under the influence of light. *It is certainly not a test for aldehyde in ether*, and unless a method is ordered for the special purification, and particularly for the preservation of ether, it will be almost impossible for retail pharmacists to obtain the drug in a state to answer the requirements of the B. P. The author thinks that advantage might have been taken of another reaction mentioned by Warden, and the following test given, instead of the one with potassium iodide. The ether should

produce no reddish yellow incrustation on caustic potash when digested with the latter for fifteen minutes.

The Detection of Methylated Ether in Ether. H. W. Jones. (*Pharm. Journ.*, 3rd series, xvi. 663.) Ether prepared from methylated spirit commences to boil at a much lower temperature than ether obtained from rectified spirit; and by such difference the two varieties may be discriminated.

By fractional distillation, the first distillate being several times fractionated, as little as 10 per cent. of methylated ether may be found when mixed with pure ether.

But whilst it is easy to detect ordinary methylated ether, it is clearly impossible to determine in the case of a liquid of correct boiling point, whether such a sample has been prepared, as the British Pharmacopœia directs, from rectified spirit, or separated by careful fractional rectification from ether originally made from methylated spirit.

Analysis of a Mixture of Milk and Cane-Sugar. A. W. Stokes and R. Bodmer. (*Analyst*, x. 62-65.) The reducing sugar is determined by means of Pavy's ammoniacal Fehling solution in the liquid containing the mixture of milk and cane-sugar, both before and after boiling, for about ten minutes, with a 2 per cent. solution of citric acid. As the latter treatment inverts the cane-sugar only, the amount of each sugar present can be readily calculated from the numerical data obtained.

Detection of Cane-Sugar in Milk-Sugar. M. Lorin. (*Pharm. Zeit. für Russland; Journ. Soc. Chem. Ind.*, December, 1885.) A mixture of equal parts of milk-sugar and oxalic acid melts when warmed upon the water bath, and becomes very faintly darker in tint. An addition of one per cent. of cane-sugar causes the rapid development of a dark tint on heating, and with several per cent. the mass is rendered greenish brown or black by this treatment. The value of this test is confirmed by Geissler. (*Pharm. Cent.*, 1885, 244.)

New Tests for Glucose and Milk-Sugar. M. Rubner. (*Zeitschr. für Biol.*, xx. 397; *Analyst*, September, 1885.) These new reactions are founded on the respective behaviour of the sugars with acetate of lead and ammonia.

If a solution of acetate of lead be added to a dilute solution of grape-sugar, and ammonia dropped in, the precipitate formed turns, on standing in the cold, gradually (quicker on warming), first yellow, then rose-red or flesh coloured. It is advisable to take 1-1.5 c.c. of acetate of lead solution, of the strength generally

used in the laboratories, to every 20 c.c. of sugar solution. The author was able to obtain a reddish yellow coloration with 5 c.c. of sugar solution of 0.02 per cent. strength.

A second reaction for grape-sugar is the following:—To the sugar solution is added a moderately large quantity of lead acetate, the mixture boiled some time, and ammonia dropped in until a permanent precipitate is obtained; the solution becomes then yellow or red, according to the concentration. After a time a precipitate of the same colour separates out, which, however, soon assumes a yellow colour. The acetate of lead should be for 10 c.c. of sugar solution of 2 per cent. strength about 4 grams; for the same quantity of a solution of 1 per cent. strength about 2 grams.

Both reactions are peculiar to grape-sugar; cane-sugar and dextrine treated in the same way give no reaction.

Milk-Sugar.—If a solution of milk-sugar be boiled three to four minutes with acetate of lead, it turns yellow or brown. If ammonia be dropped in as long as the precipitate first formed dissolves, the liquid assumes at first a deeper yellow, and then an intense brick-red colour; finally it becomes turbid, and a pulverulent precipitate of cherry-red to copper-red colour separates out. To make the test successful it is necessary to use a large quantity of lead acetate. The author obtained the best results with 8 grams of lead acetate to every 10 c.c. of milk-sugar solution of 2 per cent., or 4 grams to 10 c.c. of 1 per cent. strength. The delicacy of the reaction extends to a solution of 0.02 per cent. strength.

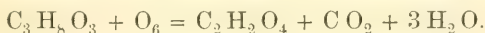
These reactions can be used for the examination of urine. Phosphates, which would interfere, can be removed by boiling the urine with acetate of iron, or by filtering the precipitate obtained on adding the lead acetate. The test for milk-sugar in urine is interesting, as until now there has been no quick method for its detection. It is conducted thus:—10 c.c. of the urine (freed from phosphates) are boiled a few minutes with 3 grams of lead acetate, and ammonia added to the boiling hot solution. The author obtained in this way a perceptible coloration with a strength of 0.02 per cent.

Sources of Error in the Estimation of Sugar in Wine by Fehling's Solution. A. Sonnenschein. (*Dingl. polyt. Journ.*, cclvi. 555.) For the determination of sugar in wine, Fehling's solution is used almost exclusively. As, however, the results are deficient in accuracy, it was thought that other ingredients present besides grape-sugar might reduce the Fehling's solution. The author therefore examined the action of tannin on this solution,

and found that it reduces it, 1 gram of CuO corresponding with 0.4126 of tannin. Glycerol acts in a similar manner. It was found that a number of other substances present in wine reduced Fehling's solution; succinic acid, for instance. The results obtained with this reagent are therefore always too high.

Estimation of Theine in Tea. A. Hilger. (*Archiv der Pharm.*, 1885, xxiii. 827.) From 10–20 grams of tea are thoroughly extracted with boiling water by a threefold treatment. The filtered solution is mixed with basic lead acetate, in not too large excess; the precipitate formed is filtered off and washed with hot water, and the fluid is freed from lead with sulphuretted hydrogen. The filtrate is mixed with washed sand and either magnesia or lime, and evaporated to dryness. The residue is *completely* extracted with chloroform, best in a Soxhlet's apparatus. The chloroform extract so obtained yields a nearly white residue, which can either be directly weighed after three hours' drying at 100°, or be recrystallized from alcohol or boiling water, and obtained as a perfectly white mass.

Estimation of Glycerin. W. Fox and J. A. Wanklyn. (*Chemical News*, liii. 15.) The authors' method is based on the fact that glycerin, oxidized with permanganate of potash in a strongly alkaline solution, gives oxalic acid according to the equation—



The oxalate can be precipitated by a lime salt, and the amount of oxalic acid determined, and the equivalent quantity of glycerin calculated therefrom. The *modus operandi* is as follows:—

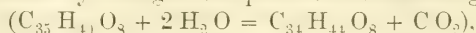
The aqueous solution of glycerin (which should not contain more than 0.25 gram of $\text{C}_3\text{H}_8\text{O}_3$) is made strongly alkaline by adding 5.0 grams of solid caustic potash; powdered permanganate of potash is then gradually added, until the solution is of a permanent pink colour; the solution is now kept at the boiling point for half an hour, and then the excess of $\text{K}_2\text{Mn}_2\text{O}_8$ decomposed with sulphurous acid; either the solution or the gas may be used. The solution, which should now be colourless, is filtered from the precipitated oxide of manganese, and made acid with acetic acid, and boiled; a lime salt is added, and the resulting oxalate collected on a filter and thoroughly washed with boiling water. As the precipitate is not pure oxalate of lime, the authors determine the oxalic acid in the lime salt by titrating with standard $\text{K}_2\text{Mn}_2\text{O}_8$ in the usual way.

In the saponification of fats in which it is proposed to estimate

the glycerin, care should be taken to have the whole of the alcohol driven off, as dilute alcohol treated with alkaline permanganate gives oxalic acid. It may be mentioned that the acids of the acetic series do not oxidize to oxalic acid with alkaline permanganate, whilst those of the acrylic series do.

Estimation of Glycerin in Wine. L. Medicus. (*Répert. der Anal. Chem.*, 1886, 1; *Analyst*, 1886, 78.) The process given in this paper is really practically that proposed by the Berlin Committee, and has therefore little novelty. 100 c.c. of the wine are concentrated at a gentle heat till only 10 c.c. are left. Two grains of sand and 3 c.c. of milk of lime (2 equivalents of lime and 5 equivalents of water) are now added, and the mass nearly evaporated to dryness. This is then extracted by four successive treatments with boiling alcohol of 96 per cent., and from the resulting solution 150 c.c. of the alcohol is recovered by distillation. The remaining fluid is evaporated to a syrupy consistence, and the syrup treated with 10 c.c. of absolute alcohol, and transferred to a stoppered bottle with 15 c.c. of ether. After standing till quite clear, the liquid is poured into a light tared and stoppered weighing-bottle; and the ether-alcohol having been driven off by heat, the bottle and contents are kept for one hour in the water-oven, then closed with the stopper, cooled, and weighed. It is doubtful whether the glycerine so weighed is absolutely pure; but the process, as tested by the author, appears, at all events, to give constant results.

Detection of Alkanet in Wine. M. Herz. (*Analyst*, August, 1885.) Wine coloured red with alkanet-root gives a yellow precipitate with ether; but the alkanet can best be extracted with amyl alcohol. To isolate the alkanet from other colouring-matters, oil of almonds, or olive oil is added, and the amyl alcohol driven off in the water-bath. The oil assumes a red colour in the presence of alkanet, which, by saponification with soda, changes to a splendid blue, disappearing on the addition of acid. Wines which have stood six months or so, with alkanet colour the oil red; the saponified solution is, however, not blue, but green. As alkanet-red is converted by nitrogen compounds into alkanet-green,



the change probably depends upon some such reaction, although ether extracts a red colouring matter, and not green.

New Method for the Analysis of Milk. M. A. Adams. (*Analyst*, x. 46-54; *Journ. Chem. Soc.*, 1886, 583.) 5 c.c. of milk are run into a tared beaker, conveniently of 30 c.c. capacity and 2 inches high by $1\frac{1}{4}$ inch in diameter. The charged beaker is weighed, and a

tared coil of dry blotting-paper is gently thrust in; as soon as all the milk is sucked up, the paper is withdrawn, and placed dry end downwards upon a glass plate; the beaker is then weighed again. The paper resting in the same position on the glass plate is roughly dried for one hour in a water-oven, is then transferred to a Soxhlet's extraction apparatus with a flask of 150 to 180 c.c. capacity, and is exhausted with ether (or light petroleum). The fat is dried and weighed in the flask, whilst the solids not fat are obtained by thoroughly drying the exhausted coil in an air-bath at 100° , and weighing. This method, owing to the large surface exposed to the solvent, ensures the complete and rapid extraction of the fat; and moreover, owing to the absence of fat in the residue, the solids not fat can be dried to constancy, and hence more thoroughly than heretofore, without the results being vitiated by oxidation. For the latter reason it is better to determine total solids by the addition of the numbers obtained for fat and solids not fat, than by drying the mixture of solids on the paper and weighing. Comparative experiments with other methods bear out the above statements; therefore by this method the fat is always higher, the solids not fat always lower; the reduction in the latter, owing to more perfect drying, is in greater proportion than the increase of the former; hence the total solids are also somewhat lower. The coils are prepared from white blotting paper, known as "white demy blotting," by cutting it into strips $2\frac{1}{2}$ inches wide and 22 inches long; these are rolled into helical coils, of diameter somewhat under an inch.

Relative Delicacy of the Tests for Metals in Drinking Water.

A. J. Cooper. (*Journ. Soc. Chem. Ind.*, Feb., 1886.) The author has ascertained the comparative delicacy of various tests for the detection of the following metals in drinking water. His results are given in the appended table:—

Metal.	Reagent.	Depth of Liquid, $3\frac{3}{4}$ inches.	Depth of Liquid, $14\frac{1}{2}$ inches. Cylinder enclosed in opaque tube.
		1 part of metal detected in—	1 part of metal detected in—
Copper	...	4,000,000 of water	11,750,000 of water
"	...	1,000,000 " "	1,950,000 " "
"	...	4,150,000 " "	15,660,000 " "
Zinc	...	2,500,000 " "	—
Arsenic	...	3,600,000 " "	7,520,000 " "
Lead	...	4,000,000 " "	5,875,000 " "
"	...	100,000,000 " "	196,000,000 " "

Potable Water. (*Amer. Journ. Pharm.*, 1886, 17, 18.) The International Pharmaceutical Congress adopted the following resolutions in reference to drinking water:—1. It should be clear, transparent, colourless, odourless, and free from suspended matter. 2. It must be fresh, have a pleasant taste, and a temperature not over 15° C. 3. It should contain air, and a certain amount of carbonic acid. The air it contains must contain 30–33 per cent. of oxygen. 4. It should not contain more than 20 milligrams of organic matter to the litre (determined by oxalic acid), and should be free from nitrogen. 5. The nitrogenous organic matter oxidized with potassium permanganate should not yield more than 0.1 milligram of albuminous nitrogen to the litre. 6. It should not contain more than 0.5 milligram of ammonia in each litre. 7. A litre of water should not contain more than 0.5 gram of mineral salts, 60 milligrams of anhydrous sulphuric acid, 8 milligrams of chlorine, 2 milligrams of anhydrous nitric acid, 200 milligrams of oxides of the alkaline earths, 30 milligrams of silica, and 3 milligrams of iron. 8. Drinking water should not contain any nitrites, sulphuretted hydrogen, or sulphides, nor should it contain any metallic salts which are precipitated by sulphuretted hydrogen or ammonium sulphide excepting traces of iron, aluminium, and manganese. 9. When kept in closed or open vessels, it should not acquire a disagreeable odour. 10. It should not contain any saprophytes, leptotrix, leptomites, hypheotrix, and other white algæ, numerous infusoria, and bacteria. 11. It should not become mouldy on the addition of white sugar. 12. When cultivated on gelatin, no bacteria which liquefy the gelatin should be formed within eight days.

The Permanganate Test in Water Analysis. A. Dupré. (*Analyst*, x. 118–121; *Journ. Chem. Soc.*, 1886, 581.) It is now recommended to conduct the treatment with permanganate and phosphoric acid (instead of sulphuric acid), in a closed vessel at 32° F. instead of at 80° F., as previously suggested by the author. By adopting the low temperature, uniformity of method and comparable results are secured; moreover, in waters rich in chlorides the tendency to loss is very greatly diminished. The use of phosphoric instead of sulphuric acid is favourable for the subsequent titration with iodine.

Estimation of Free Oxygen in Water. K. I. Williams and W. Ramsay. (Abstract of a paper read before the Chemical Society, June 17, 1886. From the *Society's Proceedings*.) The authors have instituted a comparison of Schützenberger's methods

of estimating free oxygen in water with each other and with the gasometric method with favourable results. Schützenberger's first method, which consists in adding sodium hyposulphite to a measured quantity of water, using indigo-carmin as an indicator, is stated by him to estimate only half the amount of free oxygen; his second method, in which water containing free oxygen is added to indigo-white, turning it blue, and the amount of oxidized indigo-white is estimated by hyposulphite, was regarded by him as the only accurate one. The authors disprove the assertion, and show that there is a preliminary stage in the first process when colour disappears; but that on standing for some time a blue colour appears, to destroy which permanently requires such an addition of hyposulphite as to make the total amount equal to that employed in operating according to the second method. The proportion of hyposulphite used during the first stage of method 1 to the total amount used, is 3 to 5; but they believe that this proportion was conditioned by the temperature and dilution prevailing during the experiments. It is also shown that hyposulphite of soda reacts to some extent with hydrogen dioxide, thus negating the statements of Schützenberger and of König.

Determination of Boric Acid in Mineral Waters. R. Fresenius. (*Zeitschr. für Analyt. Chem.*, 1886, Part 2.) 36·350 grams of water are mixed with sodium carbonate until the solution is distinctly alkaline, and are then strongly concentrated. The precipitate which thus separates out, consisting chiefly of alkaline earthy carbonates and ferric hydroxide, is filtered off, washed, and, as it still contains boric acid, it is dissolved in hydrochloric acid; and this solution, after dilution with water, is again precipitated at a boil with potassium carbonate. The filtrate, separated from the precipitate, is now mixed with the former filtrate, and evaporated down to a damp saline mass. The boric acid is liberated by acidulation with hydrochloric acid, and extracted with alcohol of 95 per cent. In this manner there is obtained an alcoholic solution containing all the boric acid. It is mixed with an excess of potash, distilled off, and evaporated down to a small residue. This is treated in a similar manner twice more, and the small saline mass ultimately obtained is treated with boiling water, separated by filtration from a residue consisting mainly of magnesium hydroxide, and which, after washing with boiling water, is dissolved in a little hydrochloric acid, and the solution is precipitated with potash and a little potassium carbonate. Thus a filtrate is obtained free from all alkaline earths, and containing all the boric acid, along

with potassium hydroxide and a little silica in the state of alkaline salts. From this solution the boric acid is separated according to A. Stromeyer's method.

Detection and Estimation of Small Quantities of Nitric Acid in the Air, Water, Soils, etc. A. Grandval and H. Lajoux. (*Comptes Rendus*, ci. 62-65; *Journ. Chem. Soc.*, 1885, 1093.) The nitric acid is converted into picric acid by the action of a solution of phenol in sulphuric acid; this is converted into ammonium picrate, and the colour of the liquid compared with that of a solution of ammonium picrate of known strength.

The reagents required are (1) a solution of 3 grams of phenol in 37 grams of sulphuric acid monohydrate, and (2) an aqueous solution of potassium nitrate containing 0.936 gram per litre (1 c.c. = 0.0005 gram $N_2 O_5$).

A known volume, V , of the solution to be analysed is evaporated to dryness on a water-bath, the residue carefully mixed with excess of the phenolsulphonic solution, a small quantity of water added, then an excess of ammonia, and the solution finally diluted up to its original volume, V . A certain volume of the standard potassium nitrate solution is treated in precisely the same way, and the solution of ammonium picrate thus obtained is diluted up to the same volume, V . The colour of the two solutions is then compared by means of a Duboscq colorimeter. If H is the height of the column of the liquid under examination, H' that of the column of the standard liquid, and p the amount of the nitric acid in the volume of standard solution taken, the amount of nitric acid x in the liquid analysed is given by the formula, $x = p \frac{H'}{H}$. The

quantities of nitric acid in the two solutions should be as nearly equal as possible, but the volume of the standard solution need not be exactly the same as V , since a correction can be easily made for the difference. It is convenient to prepare a series of standard solutions of ammonium picrate for comparison, and to select that which most closely resembles in tint the liquid under examination.

In applying this method to the estimation of nitric acid in air, about 50 litres of the latter are aspirated through 10 c.c. of water containing a small quantity of pure sodium carbonate, and the liquid treated as described. In the case of waters, only 10 c.c. need be taken.

This method gives results which are trustworthy to *at least* the fifth decimal place, and it will indeed estimate with considerable accuracy so little as 0.0000125 gram of nitric acid.

Detection of Nitric Acid, Nitrous Acid, and Lower Oxides of Nitrogen in Concentrated Sulphuric Acid. Dr. H. Hager. (*Pharm. Centralhalle*, 1885, 141.) The reagent here recommended is granulated ferrous sulphate, as obtained in the form of a whitish coarse powder by precipitation with alcohol. A pinch of this salt is added to the sulphuric acid in a test-tube, and shaken up with it; the salt floats in small particles, the acid remaining colourless and the salt white, even on heating. In the presence of slight traces of nitrogen acids, the acid assumes a reddish violet colour, or the white particles of the salt take immediately a violet-grey colour. The author states that this test is more delicate than that given by the German Pharmacopœia, and easier to execute.

Ferrous Ammonium Sulphate as a Reagent for Nitric Acid. A. Rosa. (*Gazzetta Chim. Ital.*, xv. 295, 296.) The author recommends this salt in the place of ferrous sulphate as a much more sensitive reagent for the detection of nitrates.

Detection of Traces of Nitric Acid. M. Curtman. (*Zeitschr. für Analyt. Chem.*, xxv. 225.) The solution to be tested is mixed with a solution of pyrogallol, and to this mixture about twelve drops of strong sulphuric acid are carefully added, so as to form a distinct layer at the bottom of the test tube. The presence of nitric acid is indicated by a brown ring where the two layers meet. In the presence of very minute traces of nitric acid the coloration obtained is yellow instead of brown. The test is said to be so delicate as to show the presence of one-tenth of a milligram of nitric acid in a litre of water.

New Method for the Detection of Nitrates. W. H. Ince. (*Pharm. Journ.*, 3rd series, xvi. 832.) Pour into a perfectly clean test-tube about 5 c.c. of pure sulphuric acid (free from nitrates) and 5 c.c. of a saturated solution of sodium phenolsulphonate; carefully fill the test-tube three-quarters full with the aqueous solution to be analysed. If nitrates are present, even in the proportion of 1 in 30,000, a brown-red ring will form at the junction of the two liquids. If less than 1 in 30,000, but more than 1 in 45,000, the brown ring will not form at once, but only after standing a few minutes, and the liquid assumes a green tint when neutralized with ammonia. Less than 1 in 45,000 cannot be detected, or less than 1 in 35,000 (2 grains in the gallon) with certainty.

A blank experiment must always be made with pure distilled water, for ordinary sulphuric acid generally contains traces of nitric acid.

If the sodium phenolsulphonate is not quite pure, a pink coloration results on the addition of acid.

Potassium phenolsulphonate is less delicate than ammonium or sodium phenolsulphonate; ferrous phenolsulphonate only detects 1 part of nitric acid in 5,000 of water.

The Volumetric Estimation of Inorganic Nitrites. G. A. Atkinson. (*Pharm. Journ.*, 3rd series, xvi. 809.) The standard solutions the author would recommend are:—

1. A 1 per mille of permanganate of potassium, carefully titrated against one of the ordinary substances—metallic iron, ferrous sulphate, etc.

2. A 12·5 per mille solution of ammonio-ferrous sulphate, containing an equal amount (12·5 c.c.) of strong sulphuric acid. 1 c.c. of this will approximately decolorize 1 c.c. of the permanganate solution, and the contained acid, while assisting its action, preserves the solution. It must obviously, whenever used, be carefully standardised against the permanganate, a process occupying only five or ten minutes.

3. A solution of pure sulphuric acid (1 in 10) is most convenient, but the pharmacopœial strength (almost 1 in 12) is suitable enough.

4. A 1 per mille solution of the nitrite, unless it be such a nitrite as nitrite of silver, the base here possessing a high atomic weight, when 2 per mille may be employed.

The details of the method are as follows:—Into a beaker of about 500 c.c. capacity, about 200 c.c. of distilled water is poured, and then about twice the quantity of permanganate required to oxidize the nitrous acid in 50 c.c. of nitrite solution is run into the same vessel, and followed by 10 c.c. of diluted sulphuric acid (1 in 10), or 12 c.c. of the pharmacopœial solution. Now slowly add 50 c.c. of the nitrite solution, the nozzle of the pipette being kept well below the surface, and moved round so as to agitate the contents of the beaker. When almost empty, the nozzle is brought above the surface and a little distilled water run over its exterior to wash off any adhering fluid from the beaker. After two or three minutes the amount of unreduced permanganate is estimated by the ammonio-ferrous sulphate solution, the end point being obtained by zig-zag titration. The ordinary processes of calculation now give the amount of nitrite.

To test the method, nitrite of silver solution containing in every 50 c.c. ·02465 gram of nitrous acid, was employed, and in six consecutive estimations the author found the quantity indicated varied between ·02463 and ·02466 gram.

Specimens of commercial nitrite of sodium usually contain nitrous acid equivalent to from 94 to 95 per cent. of actual nitrite; specimens of nitrite of potassium, 84 to 86 per cent.; while nitrite of ammonium, on account of its deliquescence, is sold in solution, which solution usually contains about 12 per cent. of nitrite.

Detection of Nitrates and Chlorates. A. Béhal. (*Journ. de Pharm.* [5], xii. 490–492.) The reaction is based on the property possessed by nascent hydrogen of reducing nitrates to ammonia and chlorates to chlorides. The solution to be tested is boiled with double its volume of strong potash solution, until the absence of ammonia in the vapour is assured, as shown by litmus-paper. A fragment of metallic zinc is added to the liquid, and a drop of copper sulphate solution; if on boiling from five to six minutes reddened litmus becomes blue in the vapour evolved, the presence of a nitrate is indicated. If the original solution contained no acids precipitable by silver nitrate after strongly acidifying with nitric acid, a portion of the liquid which has been boiled with zinc is decanted, strongly acidified with nitric acid, and treated with silver nitrate; a white precipitate indicates the presence of chlorate in the original solution. If ammonia compounds are present in the original solution, a larger quantity of potash is employed. If acids precipitable by silver nitrate in nitric acid solution are present, they are removed by means of that precipitant before testing. No account is here taken of other oxygenated compounds of nitrogen, nor of other oxygenated compounds of chlorine, nor of those of bromine. Should the last be present, the silver salt obtained is further examined by the ordinary method.

Estimation of Phosphoric Acid. J. Laubheimer. (*Chem. Zeit.*, ix. 1870; *Journ. Soc. Chem. Ind.*, 1886, 176.) This method, which is simple and rapid in execution, may be employed in all cases where hitherto it has been necessary to use the molybdic method, the result being as accurate as those obtained with the latter method. For this purpose 25 or 50 c.c. of the phosphoric acid solution (containing from 0.1 to 0.2 gram P_2O_5) are treated with 10 c.c. of citric acid (500 grams per litre). Ammonia is then added in large excess, and the cold mixture treated with 15 to 20 c.c. of the usual magnesia mixture. A crystalline precipitate is produced, the separation of which is facilitated by stirring with a glass rod for one or two minutes. After standing all night the precipitate is thrown on a filter, washed with ammoniacal water, and finally with alcohol. It is then ignited in a platinum crucible, and weighed. Phosphates rich in iron—*e.g.*, Thomas' slag—require the use of a

larger amount of citric acid and ammonia. Fassbender, of the experimental station of Kempen, has estimated the phosphoric acid in a variety of manures by this method, and compared the results with those obtained by the molybdic method. The figures agree very closely.

A Short Method for Determining Phosphoric Acid by the Molybdenum Process. M. Meinecke. (*Répertoire Analyt. Chem.*, v. 153; *Chemical News*, liii. 53.) If the well-known yellow precipitate produced on throwing down phosphoric acid with the ammonium molybdate is heated to from 400–500°, there remains molybdenum phosphomolybdate as a black residue. This compound in certain conditions is very stable, and as it is only very slightly hygroscopic, it can be weighed with safety. The author finds that its composition is constant (4.018 per cent. P_2O_5), and proposes this process as a substitute for the magnesia one in the analysis of substances containing phosphoric acid, whether in small or large proportion.

In effecting the determination, the nitric solution of the phosphate obtained in the ordinary manner, and containing from 20–25 per cent. of ammonium nitrate, is precipitated with molybdic solution at 50–60°, stirring meanwhile; and the precipitate is then set aside to settle for some hours, without any further application of heat. This departure from the usual procedure is essential in order that the phosphoric and molybdic acid in the precipitate may have the fixed molecular proportion of 1:24. After settling for two to three hours, the precipitate is collected on a filter, washed first with a faintly acid 20 per cent. solution of ammonium nitrate, until ten drops react neither with sulphuretted hydrogen nor, in case of solutions rich in iron, with potassium ferrocyanide. The washing is completed with cold water, or, to expedite the drying, once with water, once with alcohol, and once with ether. The dried precipitate is detached as completely as possible from the filter, and placed in a flat platinum capsule. The filter is then incinerated separately in a platinum crucible at the lowest possible temperature, the ash added to the main precipitate in the capsule, which is covered with platinum foil and placed over a burner, with triple air current, at a temperature just sufficient for a slow decomposition indicated by the blackening of the precipitate. In a quarter of an hour the precipitate becomes uniformly black, and may be weighed when cold.

Detection of Traces of Free Chlorine. Dr. H. Hager. (*Chem. Centr.*, 1885, 588, 693.) The reagent recommended by the

author is a solution of diphenylamine in strong sulphuric acid, which is poured gently down the side of the vessel containing the liquid to be tested. Should no blue coloration be formed, either at once or after several minutes, a small quantity of pure concentrated sulphuric acid should be added, when the presence of the merest trace of free chlorine will be indicated by the formation of a blue ring at the zone of contact between the two liquids.

A solution of naphthol in sulphuric acid, similarly applied, may be used for the same purpose, as well as for the detection of nitrogen acids. With this reagent the ring is brownish red instead of blue.

Volumetric Estimation of Chlorine. E. Bohlig. (*Zeitschr. für Analyt. Chem.*, xxiv. 408.) The liquid to be examined is boiled with magnesium carbonate, and filtered, an aliquot part of the clear solution is shaken up with dry silver oxalate, allowed to remain for a time, and again filtered; the filtrate is then treated with sulphuric acid, and titrated with decinormal permanganate solution (1 c. c. = 0.007 gram of chlorine), a correction being made for the solubility of the silver oxalate. The author has employed the method for the estimation of chlorine in water. When organic matter is present, the oxalic acid is first precipitated as the calcium salt, washed, and then titrated as before.

A Defect in the Volumetric Determination of Chlorine by Mohr's Process. G. Biscaro. (*Chemical News*, liii. 67.) If nitrates, especially those of the alkalies and earths, are simultaneously present, the precipitation of the red silver chromate often takes place too late, either because such nitrates form double salts with silver nitrate which are not precipitated by potassium chromate, so that a decided excess of silver becomes necessary, or because the silver chromate already formed is slightly soluble in those solutions. This observation is of especial importance in determinations of chlorine in organic bodies which have been ignited with lime and then dissolved in nitric acid. Besides the nitrates, other salts seem to interfere in a similar manner in Mohr's process.

Direct Determination of Chlorine in the Presence of Bromine. G. Vortmann. (*Zeitschr. für Analyt. Chem.*, xxv. 172-179.) In reply to the criticisms of Berglund (*Year-Book of Pharmacy*, 1885, 135) on the author's method (*Year-Book of Pharmacy*, 1883, 44), it is shown by numerous test analyses, that when the amount of the bromide does not exceed that of the chloride, fairly good results can be obtained under widely varied conditions of treatment. The expulsion of the bromine by heat is, however, attended with

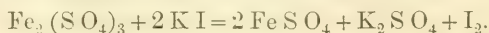
the formation of a small quantity of bromate, and the author, therefore, adopts Berglund's suggestion to expel the bromine by a stream of air in the cold. In this case, a 5 per cent. acetic acid should be used; a stronger acid favours the formation of bromate. Four or five hours are required for the complete removal of the bromine.

Detection and Estimation of Iodine, Bromine, and Chlorine. M. Dechan. (Abstract of a paper read before the Chemical Society, June 17, 1886. From the *Society's Proceedings*.) To separate iodine from a mixture of chloride, bromide, and iodide, the author distils with a concentrated solution of potassium bichromate (40 grams of $K_2Cr_2O_7$ to 100 c.c. of water); on repeating the distillation, after adding a small quantity of sulphuric acid, the bromine only passes over, provided that the solution be not too concentrated. The apparatus is therefore so arranged that by means of a stop-cock funnel water may be added whenever necessary. The following results are quoted:—

IODINE.		BROMINE.		CHLORINE.	
Taken.	Found.	Taken.	Found.	Taken.	Found.
0.01443	0.01441	0.0126	0.01254	0.0123	0.0122
0.0288	0.02833	0.0252	0.0250	0.056	—
0.0576	0.05628	0.0504	0.05009	0.194	—

Estimation of Iodine. G. Weiss. (*Chem. Centr.*, 1885, 634 and 712, 713; *Journ. Chem. Soc.*, January, 1886.) The author has lately received samples of iodine, which when estimated by the ordinary method of titration with hyposulphite, gave over 100 per cent. of iodine. This was found to be due to the presence of about 3 per cent. of bromine, an impurity due to the fact that the iodine was obtained from the last mother-liquors in the preparation of nitre, by precipitation as cuprous iodide. The greasy nature of this precipitate renders the complete washing out of the chlorides and bromides present exceedingly uncertain.

The author describes a simple method for the quantitative separation of iodine, bromine, and chlorine. The halogens must be present in the form of simple and easily decomposable metallic compounds. Concentrated ferric sulphate solution is added, and the whole boiled, when the following reaction takes place:—



During the heating a current of air is passed through the solution, and then into a solution of potassium iodide. When all the iodine has been carried over into this latter, it is removed for titration, and replaced by dilute ammonia. After the residue in the decomposing flask has cooled, a slight excess of potassium permanganate is added to it, and the flask warmed to 50–60°. Evolution of bromine soon commences, and the latter is carried over into the ammonia by the current of air, and then estimated gravimetrically or by titration. The chlorine can be estimated in the residue, or better, by difference, from a determination of the total quantity of iodine, bromine, and chlorine present in the original substance.

If the halogens are present as oxy-acids, they must be reduced by sulphuretted hydrogen or other suitable means; if in the free state, they are best converted into zinc iodide by treatment with zinc-dust.

A New Mode of Standardizing Iodine Solutions. W. Kalmann. (*Ber. der deutsch. chem. Ges.*, xix. 728, 729.) A measured volume of the iodine solution is diluted with water, treated with sulphuretted hydrogen until decolorized, and the hydriodic acid formed titrated with decinormal soda; the indicator used being methyl-orange, which is not affected by sulphuretted hydrogen. This method is accurate, and far quicker than the usual method of the comparative titration with sodium thiosulphate of the iodine solution, against a known weight of resublimed iodine.

Permanent Potassium Iodide and Starch Solution. C. Reinhardt. (*Zeitschr. für Analyt. Chem.*, xxv. 37.) To 5 grams of finely-powdered starch, thoroughly mixed with 50 c.c. of water, add 25 c.c. of potash solution (1 part of solid to 2 of water). On vigorous shaking a uniform jelly is formed. Add 500 c.c. of water and 2 grams of potassium iodide, and heat to boiling with constant agitation. Cool, dilute to a litre, and filter. A solution made as above, and not preserved from light, showed no trace of decomposition in a year.

Decolorization of Iodide of Starch by Heating. C. Tomlinson. (*Phil. Mag.* [5], xx. 168–171.) After alluding to the many but discrepant observations on the decolorization of the so-called iodide of starch on heating, and the return of the colour on cooling, the author describes experiments made with different samples of starch from maize, rice, sago, and potato. It was found that the blue colour in all cases disappeared at the temperature of boiling water, although the actual temperature of decolorization varied according to the nature of the starch. The colour was not

in any case reproduced on cooling, provided that the boiling be carried on for a sufficiently long time. Owing to the formation of a minute quantity of hydriodic acid, the blue colour can be restored on the addition of chlorine to the cooled liquid.

Estimation of Potassium Iodate in Potassium Iodide. H. Beckurts and M. Freytag. (*Pharm. Centr.*, 1886, 215.) In testing potassium iodide for iodate discordant results are often obtained by different chemists. According to J. Mühe (*Pharm. Centr.* 1886, 85), these are due to the fact that water containing carbon dioxide causes the decomposition of potassium iodide, iodine being liberated. With water free from air, and saturated with carbon dioxide under pressure, the decomposition was very marked. It was less so when water containing less carbon dioxide was used. Weppen and Lüders (*Pharm. Centralhalle*, 1886, 129), on the other hand, obtained contradictory results. The authors have, therefore, investigated the matter further. They employed two samples of potassium iodide, 5 per cent. solutions of which, in well boiled water, did not give a blue colour on adding dilute sulphuric acid and a few drops of neutral starch solution. Their results agreed with those of Mühe. The liberation of iodine (indicated by starch solution) being even obtained with a distilled water which had been kept in the laboratory for some time, and with another which had been kept in an apothecary's shop. In using a freshly-distilled water, they did not obtain the reaction immediately. They took care to ascertain the absence of nitrous acid and hydrogen peroxide in the waters tested. They obtained samples from Weppen and Lüders of the potassium iodide employed by them in their experiments, and got the same results as with their own samples. Their only explanation for the different results obtained by Weppen and Lüders is, that the water employed by these chemists contained the carbon dioxide in solution, and not as the compound carbonic acid ($\text{H}_2\text{C O}_3$), which takes some time to form. Carbon dioxide itself, it appears, does not decompose potassium iodide, for in passing the pure gas through a 5 per cent. solution of potassium iodide in well boiled water, iodine is not liberated. It appears, therefore, that the discrepancies recorded in the analysis of potassium iodide samples are due to the greater or less amount of carbonic acid in the waters used. Consequently the authors agree with Mühe in recommending that in analysing potassium iodide for an iodate, well boiled distilled water should be employed. As a consequence of the preceding facts, the authors draw attention to the uncertainty of

the conclusions as to the presence of nitrous acid in artificial mineral waters, or potable waters, when tested with a few drops of sulphuric acid and potassium iodide starch solution. In this case, therefore, they recommend the use of phenylenediamine chloride, which gives a deep yellow colour, even with traces of nitrous acid.

Volumetric Estimation of Potassium. M. Dubernard. (*Ann. Agronom.*, xi. 326-328; *Journ. Chem. Soc.*, 1885, 1262.) The following solutions are required:—Solution of sodium platinochloride in a mixture of equal volumes of alcohol and water; the solution should contain 12.15 per cent. of the salt. Solution of silver nitrate, containing 12.15 grams per litre. To titrate these solutions, weigh out 0.500 gram of pure potassium nitrate or sulphate, dissolve in 2 or 3 c.c. of water in a 100 c.c. flask, acidulate with nitric acid, add 20 c.c. of the sodium platinochloride, and fill to the mark with 95 per cent. alcohol. Filter, boil 50 c.c. of the filtrate for a minute with a pinch of zinc-dust (metallic platinum is precipitated and zinc and sodium chlorides remain in solution), make up to 100 c.c., filter, and titrate 50 c.c. of the filtrate with silver nitrate. The number of cubic centimetres of silver nitrate employed, multiplied by 4, represents the quantity necessary to precipitate the chlorine left in solution in 20 c.c. of sodium platinochloride, after precipitation of 0.500 gram of pure potassium nitrate or sulphate. The quantity of silver nitrate necessary to precipitate the chlorine originally present in 20 c.c. of sodium platinochloride, is found by measuring 10 c.c. of the latter into a 100 c.c. flask, boiling with zinc-dust, making up to 100 c.c., filtering, titrating 50 c.c. of filtrate with silver nitrate, and multiplying the number of cubic centimetres used by 4. The difference between these two quantities of silver nitrate is the quantity corresponding with 0.500 gram of pure potassium nitrate or sulphate, and is to be marked on the bottle.

In actual analysis, 5 grams of the substance are dissolved and made up to 100 c.c.; 10 c.c. of this is taken for the estimation, which is conducted as above described. When chlorides are present in the solution of the sample, another 10 c.c. must be directly titrated with the silver nitrate, and correction made accordingly. No test analyses are cited by the author.

Estimation of Alkalies. M. Kretzschmar. (*Chem. Zeit.*, x. 195.) In order to avoid the loss which usually attends the present method of determining the alkalies, the author proceeds as follows:—After the removal of the magnesium, the hydrochloric

acid solution is evaporated, and in order to insure the complete expulsion of the hydrochloric acid, when the mass is nearly dry, it is moistened with small quantities of absolute alcohol, evaporated, and dried thoroughly at 110° . The residue is dissolved, and the solution accurately halved; in the one half the chlorine, in the other the potassium, is determined, and from the results obtained the proportions of potassium and sodium are calculated.

Nessler's Solution. T. Green. (*Pharm. Journ.*, 3rd series, xvi. 922.) The author points out an error that seems to have crept into the formula for preparing this reagent given in the British Pharmacopœia, the quantity of potassium iodide mentioned therein being one-half of what must have been intended.

Volumetric Method for the Estimation of Alumina. J. K. Bayer. (*Zeitschr. für Analyt. Chem.*, xxiv. 542-546.) The acid alumina solution is mixed with sufficient soda to redissolve the precipitated alumina. It is then divided, and equal portions titrated with sulphuric acid, using in one case litmus, in the other tropœolin, as indicator. With litmus, the reddening commences as soon as the free soda as well as that present in the form of aluminate are neutralized. With tropœolin, an additional quantity of acid, being that required to convert the alumina into $\text{Al}_2(\text{SO}_4)_3$, is required before the change from yellow to orange begins. The titration with tropœolin is best performed in a porcelain basin, using not more than 50 c.c. of liquid and 0.5 c.c. of tropœolin in a second basin for comparison. Warming should be avoided, and the acid should finally be added in excess, and the excess titrated back with normal alkali.

Metals whose oxides are soluble in soda must first be removed. Bases precipitated by soda can be filtered off before titrating. Alkaline silicates are without influence.

In crude aluminate liquors, the method gives lower and more correct results than simple precipitation with ammonia and weighing; as in the latter case various impurities are precipitated at the same time.

Volumetric Method for the Estimation of Alumina. R. W. Atkinson. (*Chemical News*, lii. 311.) Phenolphthalein is recommended as superior to litmus in the first stage of J. K. Bayer's method for the estimation of alumina (preceding abstract); whilst to be certain of the end point in the second stage, an alkaline solution tinged with the requisite quantity of tropœolin should always be used for comparison.

Volumetric Estimation of Alumina. J. K. Bayer. (*Zeitschr. für Analyt. Chem.* xxv. 180–183.) For determining the excess of soda in the author's process (p. 130), it is necessary to boil vigorously and maintain the alkaline reaction of the liquid until one or two drops of acid suffice to produce the change of colour. The solution must not contain more than 0.1 per cent. of alumina. If an excess of acid has been added, it cannot be titrated back with soda, since basic aluminium sulphates are then formed. Phenolphthalein is far more convenient than litmus as the indicator.

The soda in aluminates can also be titrated after removal of the alumina by carbonic anhydride, but it is necessary to pass the gas in slowly, and to keep the dilute solution freely boiling and constantly shaken, otherwise the alumina will carry down soda.

Separation and Estimation of Copper, Cadmium, and Zinc. A. Carnot. (*Comptes Rendus*, cii. 621–624; *Journ. Chem. Soc.*, 1886, 580.) The solution containing copper, cadmium, and other metals is diluted to 200–300 c.c., acidified with 10–15 c.c. of hydrochloric acid, heated to boiling, and mixed with successive portions of ammonium thiosulphate solution until the precipitate remains white and milky, owing to the presence of free sulphur. The precipitate consists of cuprous-sulphide, which is treated in the usual way. The cadmium in the filtrate is precipitated by means of sulphuretted hydrogen or ammonium-sulphide.

Cadmium and zinc can be separated in a similar manner, with the aid of oxalic acid, care being taken to prevent precipitation of oxalates along with the sulphide. Zinc oxalate is only slightly soluble in presence of ammonium oxalate, whilst cadmium oxalate forms a double salt which is readily soluble.

The somewhat concentrated solution is neutralized with ammonia, mixed with 10 parts of ammonium chloride for 1 part of metal present (to prevent precipitation of any cadmium oxalate), and an excess of oxalic acid, and heated to boiling. Any zinc oxalate which separates is filtered or decanted off, and washed with a warm solution of ammonium chloride. The liquid is diluted to 200–250 c.c., heated to boiling, and mixed with successive quantities of ammonium thiosulphate until no further precipitation of cadmium sulphide takes place. More oxalic acid is added from time to time, if necessary.

The zinc in the filtrate is precipitated by means of hydrogen sulphide, the precipitate mixed with the oxalate previously obtained, and the whole converted into sulphide by heating with sulphur in a current of hydrogen.

Action of Pyrogallol on Copper and Iron Salts. P. Cazeneuve and G. Linossier. (*Comptes Rendus*, ci. 56-59; *Amer. Journ. of Pharm.*, 1886, 40.) When solutions of pyrogallol and ferrous sulphate are mixed in complete absence of oxygen, no change is apparent, but the introduction of a small quantity of oxygen brings about the formation of the well-known blue coloration. If, however, the pyrogallol solution is not fresh, but has been slightly oxidized, the blue coloration is produced at once. The oxygen combines simply with the pyrogallol, and does not oxidize the ferrous sulphate, since ferric salts cannot exist in presence of pyrogallol, but are instantly reduced. A mixture of a ferric salt with excess of pyrogallol gives no coloration with thiocyanates, and no precipitate with ammonium succinate.

When solutions of pyrogallol and ferric chloride are mixed out of contact with oxygen, a fugitive blue coloration is also produced, but almost instantly changes to a deep reddish brown coloration. Addition of an alkali causes the reappearance of the blue colour, and if added in excess changes it to violet. In this reaction the ferric chloride is reduced, and the ferrous salt combines with the pyrogallol, but the blue compound is at once decomposed by the hydrochloric acid which has been liberated in the process of reduction. The dark brown colour is simply due to oxidized pyrogallol. The addition of alkali neutralizes the free acid, and thus renders the formation of the blue compound possible. All strong acids prevent the formation of this compound, but feebler acids, such as boric and acetic, have not the same effect. The blue coloration is due to the combination of partially oxidized pyrogallol with a ferrous salt. If a current of air is blown through the blue liquid, or if pyrogallol is mixed with a large excess of ferric chloride and an alkali then added, a black precipitate is formed by the oxidation of the blue compound.

Pyrogallol does not give any coloration with ammoniacal cuprous chloride out of contact with oxygen, but the introduction of a trace of this gas causes the formation of a deep brownish black compound. Cupric sulphate is immediately reduced by pyrogallol, and on addition of an alkali a black coloration is produced, which is changed to red by excess of ammonia, and is destroyed by hydrochloric acid. Cupric acetate gives an immediate black coloration without addition of an alkali. It is evident, therefore, that the action of pyrogallol on copper salts is strictly analogous to its action on iron salts.

The Retention of Lead Salts by Filter-paper. L. T. O'Shea. (Abstract of a paper read before the Chemical Society, May 20, 1886. From the *Society's Proceedings*.) The absorption effect of filter-paper on dilute solutions of metallic salts has not, so far as the author has been able to ascertain, been studied. His attention was drawn to the subject whilst estimating small quantities of lead in water acidulated with sulphuric acid: although the water was perfectly clear, there was a considerable excess of lead in the unfiltered water over that in the water filtered through a single fluted filter-paper.

To test the generality of the phenomenon, various kinds of filter-paper were used. In all the experiments a solution of lead acetate containing 6 mgrm. of lead per litre (0.42 grain per gal.) was used, and in each case 50 c.c. (= 0.3 mgrm. Pb) was passed through the filter-paper folded in the ordinary conical form.

Filter-paper.	Mgrm. Pb in 50 c.c. sol. after filtering through.					
	One filter-paper, 7 cm. diam.			Two filter-papers, 7 c.c. diam.		
Schleicher u. Schüll	0.18	0.13	0.15	0.06	0.05	
English	0.10	0.09	—	0.03	0.05	
French, white	0.11	0.11	—	0.05	0.04	
„ grey	0.15	0.17	—	0.06	0.03	
German, thin (595)	0.17	0.15	—	0.02	0.02	
„ thick (597)	0.15	0.10	0.13	0.00	—	
„ thickest	0.15	0.13	0.08	0.04	0.06	

Though illustrating the phenomenon, these results are not strictly comparable, since the filter-paper was not kept constantly full; consequently larger filter-papers were used, which, when folded, would hold 50 c.c., and the time of filtration was noted.

English Filter-paper.

Time in minutes .	1.5	1.7	2.25	2.5	2.75	3
Mrgm. Pb in 50 c.c.						
filtered solution .	0.2	0.23	0.17	0.15	0.11	0.08

French, White.

Time in minutes .	3	4	4.2	7	—	—
Mrgm. Pb in 50 c.c.						
filtered solution .	0.22	0.19	0.09	0.05	—	—

French, Grey.

Time in minutes .	3	3	3.5	7	—	—
Mrgm. Pb in 50 c.c.						
filtered solution .	0.14	0.18	0.1	0.07	—	—

Washing the filter-paper with water after filtration does not effect the removal of the absorbed salt. A Schleicher and Schüll filter-paper, No. 589, *absorbed* during one filtration of 50 c.c. of solution a quantity of salt equivalent to 0.12 mgrm. lead; it then was washed twice with 50 c.c. of water:—

1st washing contained . . .	0.02 mgrm. Pb.
2nd „ „ . . .	0.00 „

On filtering the same solution twice through the same filter-paper, a quantity of salt equivalent to 0.24 mgrm. Pb was absorbed, and on treating with 50 c.c. of water nothing was washed out.

Not only does the absorption take place during filtration, but also when the paper is immersed in the lead solution, although at a much slower rate; the amounts of lead remaining after immersing a paper 7 cm. in diameter in 50 c.c. of solution (= 0.3 mgrm Pb) were as follows:—

Time in hours.	1.	2.	5.	14.
English	0.03	0.23	0.23	0.05
French, white	0.25	0.12	0.05	0.00
„ grey	0.27	0.17	0.15	0.04
German, thin (595)	0.25	0.18	0.19	0.03
„ thick (597)	0.25	0.24	0.19	0.00
„ thickest	0.25	0.20	0.18	0.00

Separation of Gold and Platinum from Arsenic, Antimony, and Tin in Qualitative Analysis. Dr. R. Fresenius. (*Zeitschr. für Analyt. Chem.*, 1886, 200.) The method here recommended is based on the observation that tin, arsenic, and antimony are volatilized as chlorides on heating their sulphides with an excess of an intimate mixture of dry ammonium chloride and ammonium nitrate, containing about four parts of the former to one of the latter. Gold and platinum are left behind in the metallic state, when their sulphides are treated in the same way. Full details of the process are given in the paper.

The Separation and Detection of Arsenic in Chemico-Legal Investigations. H. Beckurts. (*Chemical News*, lii. 104.) After giving a summary of the previous researches of Rose, Hager, Fischer, and others, in the same direction, the author recommends the following process:—The substances in question are comminuted as far as necessary, stirred up to a thin paste with hydrochloric

acid of 20 to 25 per cent. (obtained by distilling the strongest procurable hydrochloric acid with ferrous chloride, and rejecting the first 30 per cent. which pass over), and with about 20 grams of a solution of ferrous chloride of 4 per cent. (This ferrous chloride is obtained by dissolving iron-filings in hydrochloric acid of 20 to 25 per cent., and evaporating the filtered solution to dryness.) This mixture is placed in a spacious tubulated retort, the neck of which is placed sloping upwards, and is connected at an obtuse angle with a Liebig's condenser. One-third is distilled over, causing about 3 c.c. to pass over per minute. Organic masses containing large proportions of water must either be partially dried before the addition of the acid (if necessary, after approximate neutralization with sodium carbonate, to prevent loss of arsenic), or be mixed with hydrochloric acid stronger than 25 per cent. If the quantity of arsenic present is not too large, it passes entirely over in the first distillate; otherwise, when the retort has had time to cool, 100 c.c. of hydrochloric acid are added, and the distillation is renewed. The more concentrated the acid the more easily the arsenic passes over as chloride. The distillate may be placed at once in the Marsh apparatus, or it may be treated with sulphuretted hydrogen, or the bulk of the hydrochloric acid may be removed, the arsenic oxidized and precipitated as magnesium-ammonium arseniate; or the distillate may be neutralized with potassium carbonate, and the arsenious acid determined volumetrically with centinormal solution of iodine. By this process, the arsenic present as arsenic or arsenious acid passes entirely into the distillate as chloride. Arsenic sulphide is chiefly decomposed on the first distillation. The oxidized portion of the free acid passes over entirely as chloride, as also a small part of that not oxidized.

Separation and Detection of Strychnine and some other Poisonous Alkaloids. T. Chandelon. (*Zeitschr. für Analyt. Chem.*, xxiv. Part 3, 1885.) The author mixes the comminuted internal organs with an equal weight of dehydrated gypsum, breaks up the cold mass into small fragments, dries at 70°, pulverizes, and extracts at a boil with alcohol of 90 per cent., to which a little tartaric acid (1 per cent. on the weight of the organic matter) has been added. This operation is performed in a cohobator. The liquid is filtered, and the residue repeatedly washed with hot alcohol. The acid filtrate is evaporated to dryness on the water-bath, the residue taken up with a little boiling water, allowed to cool to separate fat, and filtered. The filtrate, concentrated to about 20 c.c., is

made distinctly alkaline with soda-lye, and mixed with gypsum on a watch-glass; the solidified mass is pulverized, the powder dried in the exsiccator, and then extracted with chloroform in a Soxhlet's apparatus. The chloroform solution is mixed with an equal volume of a saturated solution of oxalic acid in ether. In presence of strychnine, its oxalate is soon deposited in needles arranged in little tufts. These may be collected, washed with a mixture of equal parts of ether and chloroform, dried, and finally dissolved in a minimum of water, from which solution, on the addition of alkali, strychnine is gradually deposited in needles. Morphine, narcotine, and colchicine cannot be detected by this process. But brucine, narceine, aconitine, atropine, hyoscyamine, veratrine, nicotine, and coniine are completely precipitated from the chloroform by an ethereal solution of oxalic acid. Traces of papaverine and thebaine remain in solution.

Reactions of Alkaloids and Glucosides. (*Analyst*, August, 1885.)

Serena, in *L'Orosi*, gives the following colour-reactions, produced on treating certain of these compounds *successively* with a few drops of concentrated sulphuric acid and a very small quantity of a dilute solution of chloride of iron, with the aid of a slight heat:—

Santonin: canary-yellow; violet.

Codeine: light violet-red, deepened by heat; sky-blue.

Anilin: not changed; violet-red, becoming wine-red on heating.

Solanine: orange-red, then yellow (with water, light blue, violet).

Solanidine: same reactions.

Cholesterin: orange-red; violet (with water, green).

Sabadilline: orange-red; wine-red.

Colocynthin: orange-red; blood-red.

Papaverine: purplish red; colourless, then violet on heating.

Elaterin: reddish yellow; grass-green.

Narceine: coffee-brown; bluish green.

Opianine: no coloration; green, rapidly becoming deep blue.

Nitro-atropine: no coloration; violet.

Eserine: orange-yellow; intense brownish red (with water, cloudy light blue).

Digitalin: brownish red; bright brownish red with a point of violet, and on addition of water greenish yellow.

Smilacin: deep orange-yellow; reddish brown with violet reflection; violet, then bluish green, and on heating, light violet.

Apomorphine: not changed; at point of contact violet streaks, the bluish green mass becoming light violet on heating.

Estimation of Phenol in Crude Carbolic Acid. J. Toth. (*Zeitschr. für. Analyt. Chem.*, 1886, 161; *Analyst*, 1886, 92.) The author recommends the following method (a modification of Koppeschaar's) for determining the phenol quantitatively in crude carbolic acid:—20 c.c. of potassium hydrate solution (sp. gr. 1.25–1.30) are added to 20 c.c. of the crude carbolic acid. The whole is well shaken up, and after half an hour, the mixture is made up to $\frac{1}{4}$ litre by the addition of water. The tarry constituents of the carbolic acid separate out and are removed by filtration. The residue is washed with lukewarm water till the wash water is no longer alkaline. The whole filtrate is then treated with hydrochloric acid till faintly acid (this point is also indicated by the liquid changing colour and turning brown), and made up to 3 litres. The small quantity of tarry matter left in the filtrate does not interfere in the titration which follows. The dilution is necessary, for, in titrating, the carbolic acid solution must not contain more than 1 gram in 25 c.c. 50 c.c. are now taken, and 150 c.c. of a solution containing 2.040 grams of sodium bromate, and 6.959 grams of sodium bromide to the litre are added, together with 5 c.c. of concentrated hydrochloric acid; bromine is evolved, and tri-bromo phenol precipitated. After twenty minutes, during which the mixture is shaken up frequently, 10 c.c. of potassium iodide solution (125 grams of potassium iodide to the litre) are added; potassium bromide is formed with the excess of free bromine, and iodine liberated. After about five minutes (not longer), starch solution is added, and the free iodine titrated with a sodium thiosulphate solution (containing 9.763 grams per litre, exactly corresponding to 5 grams of iodine).

A Method for Approximately Estimating the Strength of Carbolic Acid. T. Salzer. (*Pharm. Zeitung*, 1886, 10; *American Druggist*, March, 1886.) About two years ago Dr. Vulpius suggested that the percentage of absolute carbolic acid in any sample of crystallized acid could be determined by ascertaining the amount of water it was capable of dissolving. The author has made use of this suggestion, and worked out a table, by means of which the percentage strength may be at least approximately determined.

Schliekum found that one molecule of phenol could unite with two molecules of water, which would be in the proportion of 90:36, or 100:38.3. The author found that 100 parts of the pure acid which he had in hand could combine with 35.3 parts of water, which figure sufficiently agrees with the former for all practical purposes. Of course the method cannot be expected to yield entirely accurate results; but it will be very useful in practice.

The author first prepared a series of known mixtures of pure, anhydrous, liquefied carbolic acid, with definite proportions of water, and determined subsequently, by experiment, how much water could still be added to each sample without rendering the liquid opaque (through excess of water). He obtained the following results, the figures meaning *parts by weight* :—

A mixture of C. Acid + Water				still dissolves Water.	A mixture of C. Acid + Water				still dissolves Water.
100	.	10	.	23.0	100	.	23	.	9.9
100	.	11	.	21.9	100	.	24	.	9.0
100	.	12	.	20.8	100	.	25	.	8.2
100	.	13	.	19.7	100	.	26	.	7.4
100	.	14	.	18.6	100	.	27	.	6.5
100	.	15	.	17.6	100	.	28	.	5.7
100	.	16	.	16.6	100	.	29	.	4.8
100	.	17	.	15.6	100	.	30	.	4.0
100	.	18	.	14.6	100	.	31	.	3.2
100	.	19	.	13.6	100	.	32	.	2.4
100	.	20	.	12.7	100	.	33	.	1.7
100	.	21	.	11.7	100	.	34	.	1.0
100	.	22	.	10.8					

Upon these results is based the test-table proper, which shows (approximately) the percentage of absolute carbolic acid, after it has been ascertained how much water may be added to any sample of liquefied acid without rendering it opaque.

If 10 gm. of a liquefied Carbolic Acid can still dissolve of Water —	Then the sample contains of Absolute Phenol—	If 10 gm. of a liquefied Carbolic Acid can still dissolve of Water—	Then the sample contains of Absolute Phenol—
0.1	. . 75.0	1.3	. . 83.5
0.2	. . 75.5	1.4	. . 84.5
0.3	. . 76.0	1.5	. . 85.0
0.4	. . 77.0	1.6	. . 86.0
0.5	. . 77.5	1.7	. . 86.5
0.6	. . 78.5	1.8	. . 87.0
0.7	. . 79.0	1.9	. . 88.0
0.8	. . 80.0	2.0	. . 89.0
0.9	. . 80.5	2.1	. . 89.5
1.0	. . 81.5	2.2	. . 90.0
1.1	. . 82.0	2.3	. . 91.0
1.2	. . 83.0		

If ordinary carbolic acid is examined in this manner, a correction should be made by adding 2 per cent.

Assay of Carbolic Soap. A. H. Allen. (*Analyst*, 1886, 103.) 5 grams of the sample are dissolved in warm water with an addition of from 20 to 30 c.c. of a 10 per cent. solution of caustic

soda, according to the proportion of phenols believed to be present. The cooled solution is then agitated with ether, and the ethereal layer separated and evaporated at a low temperature. The weight of the residue gives the amount of hydrocarbons, etc., in the quantity of the sample taken. The odour towards the end of the evaporation, and that observed on heating the residue, will give considerable information as to the nature of the admixture. Odours suggesting gas-tar and burning gutta-percha are very common. The alkaline liquid separated from the ether is then treated in a capacious separator with an excess of strong brine, which completely precipitates the fatty acids as sodium salts. The liquid is well agitated to cause the soap to filter, and is then passed through a filter. In cases where the soap does not readily coagulate, an addition of a small quantity of tallow or palm oil soap, previously dissolved in water, will usually overcome the difficulty. The precipitated soap is washed twice by agitating it with strong brine, the washings being filtered and added to the main solution, which is then diluted to one litre. 100 c.c. of this solution ($=0.5$ gram of the sample of soap) are then placed in a globular separator, and acidulated with dilute sulphuric acid, when it should remain perfectly clear. Standard bromine water is now added from a burette, the stopper of the separator inserted, and the contents shaken vigorously. More bromine water is then added, and the agitation and addition of bromine solution repeated alternately until the liquid acquires a faint but permanent yellow tint, showing that a slight excess of bromine has been used. If crystallized carbolic acid has been employed for making the soap, the bromo-derivative is precipitated in snow-white, crystalline flocks, which allow the faintest yellow tint due to excess of bromine to be observed with great facility. If cresylic acid be the chief phenol present, as in the case of soaps made with an article of a quality similar to Calvert's "No. 5. Carbolic Acid," the precipitate is milky, and does not separate well from the liquid, but the end of the reaction can still be observed. The addition of a solution containing a known amount of crystallized phenol is a useful device in many cases, as the precipitate then curdles readily, and the yellow coloration can be easily seen.

The bromine solution is made by mixing in a separator one measure of saturated bromine water with two measures of water. This solution contains approximately 1 per cent., and should be run out from the tap of the separator into the Mohr's burette used for the titration. The burette should be closely covered,

and the last few c.c. of the solution contained in it should never be employed for the titration, as it may have lost in strength. The bromine water must be standardized immediately before or after use, by a solution of Calvert's No. 2 or No. 5 carbolic acid, according to the kind of acid the titration has indicated to be present in the soap. This solution is made by dissolving 0.5 gram of the coal-tar acid in 20 c.c. of a 10 per cent. solution of caustic soda, together with 5 grams of a non-carbolic soap. The solution is then precipitated with brine in the same manner as the sample, the filtrate diluted to 1 litre, and 100 c.c. acidulated and titrated with the bromine solution used for the sample. The volume of bromine solution used is that required by 0.050 gram of coal-tar acid of approximately the same quality as that contained in the soap.

The remaining portion of the liquid filtered from the precipitate of soap may be evaporated to a small bulk, acidulated with dilute sulphuric acid, and the separated phenols measured, but the quantity is not sufficient to make the method satisfactory. It is generally better to employ the solution for the isolation of the bromo-derivatives. For this purpose it is acidulated with dilute sulphuric acid (without previous concentration), and bromine-water added in slight excess. From 5 to 10 c.c. of carbon bisulphide are then added, the liquid is well agitated, and the carbon bisulphide tapped off into a small beaker. The aqueous liquid is agitated with free quantities of carbon bisulphide (of 5 c.c. each) till it no longer acquires a red or yellow colour. The carbon bisulphide is then allowed to evaporate spontaneously, when a residue is obtained consisting of the brominated derivatives of the phenols present in the soap. If *crystallized carbolic soap* of fairly good quality was introduced into the soap, the bromo-derivative is obtained in fine long needles, having very little colour, and, if all heating was avoided during the evaporation of the carbon bisulphide, the weight of the residue multiplied by 0.281 gives a fair approximation to the amount of carbolic acid; but if a crude liquid article has been employed, consisting mainly of *cresylic acid* (e.g., Calvert's "No. 5 carbolic acid"), the bromo-derivative will be deep yellow, orange, or red, with little or no tendency to crystallize, and the weight will not afford even a rough indication of the amount of coal-tar acid present.

The author's paper concludes with a table showing the results obtained by the assay of representative samples of commercial carbolic soap.

The Estimation of Resin in Soaps. C. R. A. Wright and C. Thompson. (Abstract of a paper read before the Chemical Society, March 18, 1886. From the *Society's Proceedings*.) The authors have had occasion to make a number of experiments with various of the methods hitherto proposed for the determination of resin in soaps, with the general result of finding that one and all leave much to be desired in the way of accuracy. Sutherland's process (oxidation by nitric acid) in some instances gave fair results; but this occurs mostly through the balancing of two opposite sources of error, viz., incomplete removal of resin by oxidation—tending to *increase* the percentage of fatty acid found; and oxidation of true fatty acids—tending to *decrease* it. Treatment of aqueous soap solution by various processes, intended to throw out of solution true soaps of fatty acids, leaving dissolved resins, did not answer at all well in our hands: sometimes fatty soaps were retained in solution, and resins were often mechanically carried out of solution along with the fatty soaps, and no certainty of complete separation was ever attainable.

On the whole, the process recommended by Gladding (*Chemical News*, April 14, 1882) seemed to give figures more in accordance with the truth, provided the nature of the fatty matters contained in the soap examined were approximately known, so as to permit of the application of a correction-factor variable to some extent with this nature. The method consists in separating the fat acids, dissolving about 0.5 gram in 95 per cent. alcohol, neutralizing with saturated alcoholic potash, then adding a few additional drops of the latter, and boiling to saponify any small quantity of glyceride present (through imperfection in manufacture, etc.); after cooling, ether is added to 100 c.c., and finely powdered *neutral* silver nitrate, and the whole well agitated; finally, a known fraction of the ethereal solution of silver resin, etc., is treated with hydrochloric acid, and the liberated resin, etc., weighed after evaporation of the ether. According to Gladding (who, however, only quotes a very small number of test experiments), 100 c.c. of alcoholic ether dissolves 23.5 mgrms. of oleic acid, when "pure fat acid" (mixture of stearic and oleic?) is thus treated; and this correction-factor he found to be applicable with accuracy when Castile soap, linseed oil soap, and soaps containing known amounts of resin, were examined.

The authors' experience, however, is that 23.5 mgrms. (representing 4.7 per cent. on 0.5 gram fatty acids and resin) is a correction-factor by no means universally applicable. With pure stearic

or oleic acid it is much too large; with acids from castor-oil far too small; with various mixtures it is not far from the truth. Thus the values given in the table were obtained as the result of a large number of observations, which, moreover, did not always show a high degree of concordance, notwithstanding all the care taken to avoid sources of error; partly no doubt this is due to the circumstance that different specimens of oils, etc., were employed in the production of the soaps treated. The temperature was throughout not far from $18^{\circ}\text{C}.$, but was not kept absolutely uniform; which circumstance may again partly account for apparent irregularity in the solubility of the silver salts.

Although Gladding's correction of 23.5 mgrms. is not strictly applicable in all cases, yet the figures in the table indicate that it is not far from the truth in at least a number of instances of mixtures likely to occur in actual manufacture; in such cases a tolerably fair approximation to the truth is attainable by assuming that the weight of the resin apparently found in 0.5 gram of fatty acids should be diminished by some 25 mgrms., or what is the same thing, that the percentage of resin found in the total fatty acids, etc., is 5 per cent. too high. But this correction cannot be regarded as applicable universally.

Estimation of Resin in Soap. G. Heiner. (*Journ. de Pharm.* [5], xi. 434, 435.) The author recommends the following method:—A portion of the soap is decomposed by means of sulphuric acid, and the resinous and fatty acids separated are weighed. A second portion is dissolved in water and precipitated by a solution of common salt. The resin remains as an emulsion with the glycerol; the separated soap is washed with salt solution, dissolved in distilled water, decomposed by means of sulphuric acid, and the fatty acids weighed, as in the first portion. The difference gives the amount of resin. A soap prepared with 20 per cent. of resin gave 18.19 and 18.54 per cent. on analysis.

Detection of Adulteration in Fatty Oils. O. C. S. Carter. (*Amer. Chem. Journ.*, vii. 92–96.) Cotton-seed oil may be detected when added to olive oil or to lard oil, by adding 5 vols. of absolute alcohol and an equal volume of a 1 per cent. solution of silver nitrate in absolute alcohol; if cotton-seed oil is present, the mixture will rapidly darken on warming to 84° . The presence of much of the drying oils, such as linseed, hemp-seed, or poppy-seed oil, is shown by treatment with nitrogen peroxide; they do not solidify from formation of elaidin. The ease and completeness with which an oil may be saponified is a valuable test; lard oil saponi-

fies easily; shark-liver oil and African fish oil resist saponification.

Determination of the Melting-point of Fats. C. Reinhardt. (*Zeitschr. für Analyt. Chem.*, xxv. 11-19.) The author recommends a modification of Guichard's method. A glass tube of the same thickness as the walls of the thermometer bulb is plunged into the melted and filtered fat, so as to fill its end with a solid plug of the fat of the same length as the thermometer bulb. After a day or two the tube is connected with a vessel containing air under a definite pressure, and the end containing the fat is then heated as usual in a vessel of water with the thermometer bulb on a level with the fat. The temperature is taken at the moment when the fat is driven out of the tube by the air pressure. The result is influenced both by the diameter of the tube and by the amount of the pressure.

Indigo Testing. H. M. Rau. (*Chemical News*, li. 207, 208.) The following modification of Fritsche's method is recommended:—About 2 grams of the finely powdered sample are introduced into a flask fitted with a doubly bored rubber stopper, through which pass a tube provided with a stopcock, and a syphon-tube reaching nearly to the bottom of the flask and terminating in an inverted funnel, which is filled with glass-wool; the whole apparatus is weighed, and about 20 c.c. of a 40 per cent. caustic soda solution, 60 c.c. of water, and about 120 c.c. of 70 per cent. alcohol, are added; after these additions the apparatus is again weighed. The syphon is now closed, the flask heated on a water-bath, relieving pressure from time to time, until solution is complete; after an hour the clear liquid is poured off through the syphon, and in order to ascertain the quantity the flask is quickly weighed again. The indigotin and indirubin are precipitated from the liquid in crystalline flakes by means of a current of carbonic anhydride; the precipitate is filtered, washed, dried, and weighed. From the weight so obtained, the amount of indigo present is calculated.

The Red Colouring Matters of Wine and Vegetables. M. Terreil. (*Bull. de la Soc. Chim.*, xlv. 2-6.) The red colouring matter of wine and of the skin of black grapes, plums, gooseberries, raspberries, mulberries, elderberries, also of the flowers of the corn poppy, mallows, and roses, are precipitated from their solutions by an excess of hydrochloric acid, slowly at the ordinary temperature, but rapidly on boiling. The precipitate always contains an ulmic substance, from which the colouring principle may be dissolved

out by alcohol; thus obtained, it forms brittle, varnish-like scales, insoluble in water and ether, but readily soluble in alcohol, forming a brownish red solution with a slightly yellowish tinge; acids change this colour to an intense red, whilst alkalies give a green coloration, changing rapidly to a brownish yellow on exposure to the air.

The red colouring matters of the beetroot and the fruit of the *Phytolacca decandra* are not precipitated by hydrochloric acid, but on boiling with it first become more brilliant, then change to a violet, and finally turn to a brownish yellow.

The red colouring matters of logwood and other dyewoods, and of orcein are precipitated by hydrochloric acid, but the precipitate is soluble in boiling water, and dissolves in dilute alkalies with a violet coloration, which becomes brown on exposure to the air.

The colouring principle of the cochineal is also precipitated by hydrochloric acid; the precipitate is soluble in dilute alkalies, forming a violet solution of a more brilliant colour than that furnished by the dyewoods, and it turns brown more slowly on exposure to the air.

Litmus yields a precipitate with hydrochloric acid, which is soluble in alcohol with a red colour, and in dilute alkalies with a permanent blue colour.

Examination of Carmine. M. Dechan. (*Pharm. Journ. Trans.* [3], xvi. 511, 512.) Carmine, the compound of alumina or tin with the colouring matter of cochineal, is met with in commerce adulterated with aniline-scarlet, vermilion, chrome-red, albuminous and starchy matters, and uncombined alumina; all of which, with the exception of the first, are insoluble in dilute ammonia. Hence the following method is recommended for the examination of carmine. The sample is exhausted with dilute ammonia, which removes the carmine, the insoluble portion is dried and weighed, then treated with hydrochloric acid; the loss is uncombined alumina, lime, etc.; the ash and organic matter are determined in the residual matter. Ash and moisture are likewise determined in the original sample, and if necessary, the mercury. Aniline-scarlet dyes wool of a red-orange tint, whereas cochineal-carmine gives a purple-red; this admixture can be readily detected by boiling a piece of white woollen stuff for a half an hour in the ammoniacal solution, and examining the tint produced. The numerical relation of the combined alumina and lime to the colouring matter in carmine is not definite, as the combination is not purely chemical, but of a physico-chemical nature.

Studies of Disinfectants. A. W. Blyth. (*Proc. Royal Soc.*, xxxix. 259-276; *Journ. Chem. Soc.*, 1886, 573.) The conclusions drawn from these experiments are that cresol and phenol have about equal merits as disinfectants, that ferrous sulphate is untrustworthy as a disinfectant, and that with the amines the disinfecting action is in the following order: methylamine, ethylamine, propylamine, and ammonia; methylamine being the most active. Of the pyridine bases, pyridine and parvoline are the most active. The shorter the time a disinfectant acts, the less the disinfection. Disinfection is more active at 35.5-37° C. than at ordinary temperatures.

Purification of Drinking Water by Alum. P. T. Austin and F. A. Wilber. (*Chemical News*, li. 241-244.) The authors strongly advocate the use of alum for the purification of water, alleging that it not only clarifies but also removes disease-germs and ptomaines.

On adding 2 grams of alum to 60 litres of a rather turbid drinking water, a precipitate settled, and perfectly clear water was obtained after forty-eight hours. The dried precipitate contained per cent. C 16.50, H 2.02, N 0.77, ash 59.28, the latter consisting of small amounts of silica and alumina, large amounts of iron oxide, and considerable quantities of phosphoric acid. The clear water contained the merest trace of aluminium, and a further addition of alum caused no precipitation in it.

The Use of Ferrous Sulphate in Agriculture. A. B. Griffiths. (Abstract of a paper read before the Chemical Society, December 17, 1885. From the *Society's Proceedings*.) Wheat crops have been grown during the past season by the author with and without the addition of iron sulphate to the land ($\frac{1}{2}$ cwt. to the acre). The crop grown with iron sulphate yielded $32\frac{1}{2}$ bushels of grain, while that grown without yielded 30 bushels; hence it appears that iron sulphate is not such a good manure for cereals as for root and leguminous crops. On the other hand, Mr. Edgson, of Etton, near Peterborough, has used iron sulphate with considerable benefit for wheat crops this year. It is stated that iron sulphate used as a top-dressing to grass-land destroys moss, and that the ashes of the dead moss contained 11.56 per cent. of iron oxide. The grass, on the other hand, grew well after the treatment, and the amount of ferric oxide in its ashes was only 2.46 per cent. It is also stated that a solution containing 0.1 gram of iron sulphate in 100 grams of water destroys *Peronospora infestans* and its spores; also the "wheat-mildew" and its spores.

In a series of experiments with potatoes, three plots of land of the same size were manured—*B* with iron sulphate and artificial manures, *C* with the artificial manure alone, and plot *A* was left normal. *B* gave a yield of $8\frac{1}{2}$ tons of tubers, *C* $6\frac{1}{2}$ tons, and *A* only 3 tons.

The best way to apply the sulphate to the land is as a top-dressing, the quantity being $\frac{1}{2}$ cwt. to the acre.

Zinc Salts as Plant Poisons. A. Baumann. (*Bied. Centr.*, xiv. No. 2.) The presence of zinc in plants has been repeatedly observed, and not only in such as grow near deposits of zinc ores, but also, though in minute quantities, in plants where no zinc could be traced in the soil. From a number of experiments the author found that the injurious action of zinc sulphate in solution was more considerable than it had been assumed. In solutions of 1 mg. of zinc per litre all plants vegetated undisturbed, whilst with 5 mg. per litre all perished. Old plants of any kind died more rapidly than young plants. Insoluble compounds of zinc in the soil—such as zinc oxide, sulphide, and carbonate—have no perceptible action. The poisonous action of zinc on plants seems to depend on the destruction of the chlorophyll.

The Toxic Action of Arsenic, Lead, and Zinc on the Vegetable Organism. F. Nobbe, P. Baessler, and H. Will. (*Bied. Centr.* xiv. No. 3.) Peas, oats, and maize, as also young alders and planes, in vigorous growth, were treated with potassium arsenite; the quantities applied to peas and oats were 0.003, 0.033, 0.333, and 1.0 gram per litre of the culture liquid; and to maize 0.0033, 0.005, 0.010, and 0.020 gram. The death of the plants ensued in a few days, even in case of the smaller doses. An inquiry into the cause of death showed that the arsenic, in virtue of its action upon the protoplasm of the root-cells, annuls their osmotic power, and thus prevents the absorption of water. The lower limit of the injurious action is not yet reached at one part per million. The quantity of arsenic actually taken up by plants is exceedingly trifling. If a plant is exposed for a short time only to the action of arsenic, and is then restored to normal conditions, the action of the poison is delayed, but morbid growth or death nevertheless occur. Experiments with lead and zinc showed that these metals, whether in the state of soluble nitrates or insoluble carbonates, are highly injurious to vegetation, even in such small quantities that the plants appear outwardly healthy.

Arsenic in the Soil of Cemeteries. MM. Schlagdenhauffen and Garnier. (*Comptes Rendus*, c., 1388-1389.) The authors' results confirm those obtained by Orfila in 1847, and prove that arsenic cannot be transferred from an arsenical soil to a corpse through the medium of rainwater percolating through the soil.

MATERIA MEDICA AND PHARMACY.

PART II.

MATERIA MEDICA AND PHARMACY.

Note on Rio Ipecacuanha. W. Kirkby. (*Pharm. Journ.*, 3rd series, xvi. 126.) This drug is generally referred to *Ionidium Ipecacuanha*; but the author's microscopical comparison of an alleged specimen of the Rio drug with an undoubted specimen of the root of the plant named, establishes notable differences between the two.

The root of *Ionidium Ipecacuanha* exhibits on a transverse section a thin brown epidermal layer, surrounding a thick band of cortical parenchyma; within this is a vascular cylinder composed of pitted vessels and xylem fibres. There are no parenchymatous rays in the woody column.

A section of the Rio ipecacuanha (?) differs from the above in several important particulars. It consists of a cortex and a xylem column. In the cortical portion are found large wedge-shaped groups of sclerenchymatous cells, the apices of the wedges being directed towards the circumference. The woody centre is traversed by medullary rays, some of them being rather broad; the vessels are somewhat smaller than in *I. Ipecacuanha*.

It is therefore evident that this so-called Rio ipecacuanha is not the root of *Ionidium Ipecacuanha*.

Simple Mode of Estimating Ipecacuanha. A. B. LYONS. (*Amer. Journ. of Pharm.*, November, 1885.) Place in a small flask (capacity about 50 c. c.) $2\frac{1}{2}$ grams, accurately weighed, of ipecacuanha in fine powder; select a sound cork to fit the flask, and weigh flask and cork with the contained ipecacuanha. Fill the flask nearly full with a mixture of ether, ammonia, and alcohol, and set aside, shaking occasionally, for twenty-four hours. Weigh the flask with its contents before removing the cork; decant as much of the clear fluid as practicable, taking care to operate rapidly, to avoid evaporation. Immediately cork the flask again and weigh. The alkaloid may now be separated from the

decanted portion of ether by shaking repeatedly with acid water, and again washing out from the aqueous solution, rendered alkaline, with chloroform; but identical results can be obtained more rapidly by merely evaporating the ether after addition of water containing 10 minims of 6 per cent. sulphuric acid, and titrating the aqueous solution (made up to 20 c. c.) with Mayer's reagent.

The calculation of the assay is not difficult. We have as data, total weight of the solvent used and weight of the portion of solvent with contained alkali, resin, etc. It may be assumed that the solvent has taken up in all 5 per cent. of material from the *ipecacuanha*. This will amount to $2.5 \times 0.05 = 0.125$, to be added to the weight of the total solvent—a quantity so trifling that it may be neglected in practice,—since this assay is not close enough to render minute fractions of any importance.

Supposing the weight of the solvent to have been 40 grams, the portion decanted 26 grams, and the alkaloid obtained from this decanted fluid to have been 0.055 gram ($= 5.82$ c. c. of the reagent used); then, $26:40::0.055:x$, x being the quantity of alkaloid contained in the 2.5 grams of the drug used, we obtain as a result, $40 \times 0.055 \div 26 = 0.0846$. Since the quantity of the drug used was 2.5 grams, this result, multiplied by four, with the decimal point removed one place towards the right, will give the percentage (approximately) of alkaloid in the drug, which in the above example amounts to 3.384 per cent.

The Root of *Danais Fragrans*. E. Heckel and F. Schlagdenhauffen. (*Comptes Rendus*, ci. 955-957; *Journ. Chem. Soc.*, 1886, 173.) This root, contrary to the statement of Bourdon, contains no alkaloid. The colouring principle, which is also the therapeutic agent, was isolated by precipitating the extract of the root with basic lead acetate, decomposing the precipitate with sulphuretted hydrogen, and evaporating the red solution to dryness after filtering. The residue is a greenish brown substance, completely soluble in alcohol, acetone, and methyl alcohol, less soluble in chloroform and ether, and only slightly soluble in cold water, but completely soluble in boiling water. The greater part sublimes unchanged when heated, but a small portion is carbonized. This substance, to which the author gives the name *danain*, has the composition $C_{14}H_{14}O_5$, and splits up into half its own weight of glucose, and a resinous amorphous compound, *danaidin*, which probably has the composition $C_{22}H_{20}O_6$.

Madar. C. J. H. Warden and L. A. Waddell. (*Pharm. Journ.*, 3rd series, xvi. 165-170.) In India, under the popular

name of "määdär," two plants, belonging to the natural order of *Asclepiadiaceæ*, are known—the *Calotropis gigantea*, or *Asclepias gigantea*, and the *Calotropis procera*, or *C. Hamiltonii*. The former is one of the commonest weeds throughout India, and is most abundant in the lower provinces and Eastern India; while the *C. procera*, which most closely resembles it, is found chiefly in the drier parts of Northern and Central India.

The authors give a lengthy account of the history and the botanical, microscopical, and medicinal character of this drug, as well as of a chemical examination of it recently made by them. Reference should be made to the original article, as it is not suited for abstraction.

Note on a New Variety of Rhatany. E. M. Holmes. (*Pharm. Journ.*, 3rd series, xvi. 878.) The rhatany described in this paper had been imported from Guayaquil, in Ecuador, and differs considerably from the Peruvian root as well as from *Savanilla rhatany* and from the Pará drug. It is a large woody root, from one to two inches or more in diameter in the larger specimens, and about half an inch in the smaller roots. All the pieces are strongly contorted. The bark is of a reddish-brown colour with blackish streaks, is thin in comparison to the medullium, is of a fibrous texture, and is somewhat striated on the surface and dotted over with small warts. It has a very astringent taste, but no marked odour.

The author does not think it probable that this root is derived from the species used in New Granada, viz., *Krameria spartioides*, since all the known species of *Krameria* are either herbaceous plants or undershrubs; whilst the root under consideration resembles more nearly that of a large shrub or small tree.

From a preliminary examination of the microscopic structure of the root, the author has reason to believe that the plant yielding it, although probably not a *Krameria*, may belong to a genus nearly allied. The introduction of the drug into the London market, under the name of rhatany, renders a chemical examination of its properties desirable. The taste of the root being remarkably astringent, it occurred to the author that some indication of its value as an astringent might be obtained by a comparison with the other commercial species of rhatany in respect to the amounts of tannin afforded by them. Dr. B. H. Paul kindly undertook to make the comparison, and has communicated to the author the following results, obtained in his laboratory by Mr. F. W. Passmore:—Taking a quantity of the bark only, of the root of the Guayaquil rhatany sufficient to yield 100 parts of tannin, a similar quantity

of the root, including both bark and wood, of Peruvian rhatany yielded only 37·6 parts of tannin; Guayaquil rhatany, 41·3 parts; Pará rhatany, 45·7 parts; Savanilla rhatany, 49·3 parts. The proportion of tannin contained in the bark alone of the Guayaquil rhatany is therefore relatively more than twice as much as that contained in Savanilla rhatany root. Although the amount of tannin is apparently greater both in the Savanilla and Pará rhatany than in the Guayaquil variety, it must be borne in mind that the proportion of the wood to the bark is much greater in the latter, being 62 per cent. of wood to 38 per cent. of bark in the specimen of Guayaquil rhatany examined by Dr. Paul.

It is thus evident that the Guayaquil rhatany contains a larger quantity of tannin than the Peruvian drug, but less than either the Savanilla or Pará varieties; the separated bark of the Guayaquil root being, however, more than twice as rich in tannin as either of those roots.

Remarks on the Toxic Properties of Sassafras. Dr. J. Bartlett. (*Druggists' Circular*, March, 1886.) Recently paragraphs have appeared in the medical journals, in which it is stated that sassafras is not the innocent agent that it has been supposed to be, but that in reality it has violent toxic properties. This statement is made upon the authority of Dr. Charles L. Hill, whose investigation would seem to show a triple resemblance to three familiar articles—opium, strychnine, and ergot.

In its action as a narcotic and sudorific, it resembles opium.

In its property of inducing tetanic and clonic spasms, followed by paralysis, it is similar to strychnine.

In its power of exciting the uterus, it may be likened to ergot.

It may be of interest here to call attention to the fact that the first reference to the use of ergot as an ecbotic was made by Stearns, in 1807, whereas it had been used by midwives certainly as early as 1688, and probably very much earlier.

Constituents of the Root of Baptisia Tinctoria. Dr. Schroeder. (*Chem. Zeit.*, October 14, 1885, 1481.) The author shows that the principal constituents of this root are the following:—

“Baptisin,” a glucoside insoluble in water, which behaves physiologically as an indifferent bitter substance.

“Baptin,” another glucoside, soluble in water, crystallizing in needles, and having a slightly purgative action.

“Baptitoxine,” an alkaloid having a poisonous action even in small doses. In frogs this alkaloid produces cessation of the respiration, and then paralysis; in warm-blooded animals it causes

a slowing of the respiration and an increase in the reflex irritability of the medulla.

Parameria Vulneraria. Dr. P. Zipperer. (*Archiv der Pharm.*, November, 1885, 817; *Pharm. Journ.*, 3rd series, xvi. 447.) The author describes and illustrates the structure of the root of *Parameria vulneraria*, which is used by the natives of the Philippine islands as well as by the residents there to furnish a kind of balsam that possesses remarkable healing properties. This is known by the name of Cebú or Tagulaway balsam. It is prepared by boiling the bark of the roots and twigs, as well as the leaves of the plant, in cocoa-nut oil, and forms a yellowish white oily liquid having a peculiar odour. The author's examination of the plant shows that it contains 8.5 per cent. of caoutchouc in its tissues, and 3 per cent. of resin soluble in alcohol, and to these constituents its value appears to be due. The author states that during two years' residence in the Philippines he had seen the balsam used by European doctors, as well as by the natives, with great success in various skin diseases and for healing wounds. It appears to promote an unusually rapid cicatrization. The plant is a climber, growing in the mountainous declivities of the island of Cebú, whence it is chiefly obtained. The fragments of leaves and twigs in the possession of Dr. Radlkofer were sufficient to enable this eminent histologist and botanist to assure himself by the microscopical structure alone that the plant differed from the only two other species of *Parameria* known, viz., *P. glandulifera*, and *P. philippensis*.

Rhubarb Root. M. Kubli. (*Pharmaceutische Zeitschrift für Russland*, xxiv. 193; *Pharm. Journ.*, 3rd series, xvi. 65, 66.) The experiments recorded by the author establish the fact that chrysophanic acid is first formed in rhubarb root upon digestion of the latter with water; and that therefore little or none of this acid exists preformed in the more important kinds of rhubarb. The formation of chrysophanic acid is due to the splitting up of the mother substance, chrysophan, effected probably by a ferment-like body, which is soluble in water, but not soluble in alcohol; it is for this reason that an alcoholic extract of the root can be evaporated without decomposition, because while chrysophan will be contained in it, the body causing the fermentation will not. In this way also it is explained, sufficiently for present purposes, how an extract of rhubarb prepared with dilute spirit—for instance, tincture of rhubarb—will deposit from time to time a precipitate which, according to Clarke, consists chiefly of chrysophanic acid. In such an extract there is, besides the chrysophan

of the root, a part also of the body capable of acting upon it as a ferment. The breaking up of the glucoside is therefore only imperfectly and gradually effected.

In an aqueous extract of rhubarb—and consequently in all the official extracts prepared by macerating the root with water,—it would appear that only a little chrysophan can be expected, because under such conditions the glucoside undergoes decomposition. This agrees with the experience of the author in a previous investigation, when he obtained not more than 0·6 or 0·7 gram of chrysophan from 420 grams of “crown” or good Chinese rhubarb. On the other hand, all the separated chrysophanic acid will be found after the maceration in the residual marc; the residue after the preparation of *extractum rhei* could therefore be profitably used as a source of pure chrysophanic acid, as the article appearing in commerce is not generally pure. For this purpose the dried and powdered marc should be heated to boiling with three times its weight of alcohol, at least 90° Tr., in a retort provided with a return condenser, the temperature maintained five minutes, the liquor filtered, the residue boiled a second time with 1½ times its weight of alcohol, again filtered, and the united filtrates allowed to stand twenty-four hours in the cold in a stoppered vessel. A large portion of the chrysophanic acid will separate in a granular crystalline condition. If the supernatant liquid be decanted, the alcohol distilled off, and the residue treated with dilute alcohol (40–50° Tr.), in which chrysophanic acid is insoluble, a further quantity of colouring matter may be obtained.

Franciscea Uniflora. (From *The Lancet*.) The manaca root of Brazil (*Franciscea uniflora*) contains an alkaloid for which the name “francisceine” is proposed. The same base also occurs in other species of the same genus. It is powerfully purgative and diuretic, and also has diaphoretic and emmenagogue properties.

Chemical Examination of the Rhizome of *Cypripedium Pubescens*. V. C. Daggett. (*American Druggist*, July, 1885.) The constituents established by the author to be present in this rhizome are the following:—Traces of volatile oil, fixed oil, two resins, volatile acid, tannin, gallic acid, gum, sugar, starch, sodium chloride, magnesium salts, ligneous matter, and a bitter principle (probably a glucoside).

The Amount of Starch in Ground Ginger. E. W. T. Jones. (*Analyst*, 1886, 75.) The author shows that ground ginger contains upwards of 50 per cent. of starch, and not 20 per cent., as stated in some text-books.

Note on Alkanet Root. C. J. S. Thompson. (*Pharm. Journ.* 3rd series, xvi. 860.) Although not used in pharmacy, alkanet root is well known as being largely used to colour oils, etc., which are chiefly used in perfumery. It is also employed for staining wood, to which it imparts a beautiful crimson colour, and in ancient times was used to stain the skin.

The *Achusa tinctoria*, Linn., or as called in France, *Orcanette tinctorale*, is a perennial herbaceous plant, growing in the temperate regions of Europe, belonging to the natural order, *Boraginaceæ*. The name is from the Greek, *anchousa*, a paint. It bears deep purple, funnel-shaped flowers, which grow in one-sided spikes, the segments of the calyx being longer than the corolla. The root is long, cylindrical, and furnished with fibres, being a dark red externally, and white in the centre. It is without smell, having a sweetish, followed by a bitter and styptic, taste, and is supposed to possess astringent properties.

It yields a red resinoid colouring matter, called anchusin, the formula being given as $C_{35}H_{40}O_8$; this is insoluble in water, but soluble in oils, alcohol, chloroform, and ether.

The colouring matter may be isolated by exhausting the root with ether, a good sample yielding from 5 to 6 per cent. of anchusin, as the following results show:—

Sample.	Percentage of Colouring Matter.							
No. 1	5.50
No. 2	5.25
No. 3	5.63
No. 4	6.02

Anchusin is soluble when treated directly with any of the alkaline hydrates, and changes to a rich deep blue, which on the addition of an acid again resumes its crimson colour.

It will be found quite as delicate a test as litmus, a single drop of a dilute acid being sufficient to produce the change of colour. A solution of anchusin in alcohol changes colour in the same manner on the addition of an alkali.

Some strips of unsized paper soaked in the alkaline solution, and prepared in the same way as litmus paper, will be found to answer the same purpose exactly, giving equally good results.

Constituents of the Root of *Stillingia Sylvatica*. W. Bichy. (*Amer. Journ. Pharm.*, November, 1885, 529-531.) The author's analysis of the root gave the following results:—

	Per cent.
Moisture.	15.50
Ash	5.00
Benzol Extract (resin, fixed and volatile oil, colouring matter)	5.00
Alcoholic Extract (tannin, alkaloid, resin)	21.98
Aqueous „ (gum)	2.75
Acid „ (starch)	23.73
Alkali „ (colouring matter)	6.55
Cellulose	20.06
Total	100.57

Constituents of Chicory-root. A. Mayer. (*Bied. Centr.*, 1885, 828.) Three samples of Dutch roots contained the following substances in parts per 100 :—

Water	72.00-77.3
Albuminoids	1.1
Fats	0.2
Inulin and other Non-nitrogenous Mat- ters insoluble in Alcohol	12.00-17.3
Crude Fibre	1.40-1.8
Sugar, etc.	5.60-6.0
Bitter Extract.	0.05-0.15
Ash.	1.40-1.9

The bitter compounds extracted by chloroform are soluble in water and alcohol, but insoluble in ether; they are precipitated by tannin or lead acetate, but are absorbed by bone charcoal; they are decomposed by sulphuric acid, but do not then yield any substance capable of reducing Fehling's solution.

Nabalus Albus. N. B. Williams. (*Amer. Journ. of Pharm.*, 1886, 117.) *Nabalus albus* is known as white lettuce, lion's foot, and rattlesnake root. The milky juice used internally, and the leaves applied topically, were formerly employed in bites of the rattlesnake; and a decoction of the root is used in domestic practice in dysentery, and as a tonic. The author describes the root as being tuberous, from 1 to 6 inches long, $\frac{1}{2}$ to 1 inch thick, furnished with several rootlets, yellowish, internally white, and emitting a milk-juice; after drying it breaks with a short fracture, and is readily powdered; the odour is slight and peculiar, and the taste bitter.

A *tincture*, made with diluted alcohol, 4 ounces of the powdered root to the pint, was of a deep amber colour, and was advantageously used by a physician in anemic diarrhoea, chronic dysen-

tery, and in typhoid fever, for its tonic and astringent properties ; also topically in a case of *pruritus ani*.

A proximate analysis of the root showed the presence of tannin, gum, extractive, colouring matter, waxy matter, and resins, partly soluble in ether. The ash amounted to about 12 per cent.

Constituents of the Rhizome of *Xanthorrhiza Apholia*. S. S. Jones. (*Amer. Journ. Pharm.*, 1886, 161.) The rhizome reduced to a powder contained 10·64 per cent. of moisture, and yielded 1·70 per cent. of ash ; of the latter, 0·90 was soluble in water, 0·62 soluble in HCl, and 0·18 insoluble in either ; it contained potassium, calcium, magnesium, and iron, with carbonic, sulphuric, and phosphoric acids.

The proximate analysis gave the following results :—

Soluble in Petroleum Spirit . . .	·015	
Volatile Oil		·009
Resin soluble in Absolute Alcohol . . .		·006
Soluble in stronger Ether	1·300	
Resin with traces of Alkaloid		1·300
Soluble in Absolute Alcohol	1·320	
Resins sol. in Chloroform, Benzol, etc.		·660
Alkaloids		·280
Other Organic Compounds		·300
Inorganic Matter		·080
Soluble in Distilled Water	6·100	
Mucilage and Albumen		·070
Dextrin, etc.		·130
Glucose		·250
Saccharose		·990
Other Organic Matter		3·940
Inorganic Matter		·720
Soluble in solution of Sodium Hydrate (2 per cent.)	4·250	
Mucilage and Albumen		2·100
Other Organic Matter		1·450
Inorganic Matter		·600
Soluble in dilute Hydrochloric Acid (1 per cent.)	8·250	
Starch and other compounds		7·830
Inorganic Matter		·420
Loss by treatment with Chlorine Water	12·345	12·345
Residue remaining	65·180	65·180
Loss	1·240	1·240
	<hr/> 100·000	<hr/> 100·000

The alcoholic resin was purified by repeated solution in alcohol and precipitation with water, when it had the consistence of

Burgundy pitch, melted at $74^{\circ}\text{C}.$, and dissolved at $50^{\circ}\text{C}.$ in all proportions of absolute alcohol. At $15.5^{\circ}\text{C}.$ 1 part of resin dissolved in 23 parts of alcohol, 2.6 parts of chloroform, 10.5 parts of benzol, 78 parts of carbon disulphide, 1,200 parts of petroleum spirit, and in 6 parts of solution of potash (5 per cent.). In contact with camphor, a rather soft mass is produced, which becomes harder on standing. The resin has a neutral reaction; its taste is rather pungent, with a slight bitterness, probably due to adhering alkaloid.

The alcoholic extract, freed from resin, gave with potassio-mercuric-iodide a precipitate equivalent to 0.28 per cent. of alkaloids. Precipitated by acids, the following amounts of berberine were obtained: with picric acid, .14; with sulphuric acid, .09; with hydrochloric acid, .10 per cent. After various methods had been tried for the separation of the alkaloids, the following results were obtained: the alcoholic tincture of 350 grams of the drug was concentrated to 200 c. c., mixed with excess of sulphuric acid, and set aside for twelve hours at between -2° and $-3^{\circ}\text{C}.$ The filtrate from the impure berberine sulphate was freed from alcohol by evaporation, poured into water to separate resin, the filtrate precipitated with ammonia, and the precipitate purified by washing, solution in sulphuric acid, precipitation by ammonia, solution in alcohol, treatment with animal charcoal, and evaporating. The residue, treated with chloroform, gave a resin-like mass which could not be crystallized, and which, dissolved in acidulated water, gave alkaloidal reactions with platonic chloride, gold chloride, and potassio-mercuric iodide; and the aqueous solution, evaporated, did not give the characteristic colour reactions of berberine with Fröhde's reagent, sulphuric acid, sulphuric and nitric acids, nitric acid, or chlorine water with hydrochloric acid. These results show the absence of berberine, and the presence of a second alkaloid in the solution obtained as above.

The aqueous extraction of the drug, on being mixed with 2 parts of alcohol, precipitated mucilage and albumen; after concentration and precipitation with 4 parts of alcohol, dextrin, etc., was obtained; glucose was estimated by Fehling's solution, and saccharose by the same test-liquid, after boiling the liquid with hydrochloric acid and deducting the glucose previously found.

Constituents of *Aristolochia Fœtida*. H. Trimble and S. S. Jones. (*Amer. Journ. of Pharm.*, 1886, 113.) The root of the above plant, obtained from H. J. Schuchard, of San Antonio, Texas, consists of globular pieces, much resembling jalap in size and appearance; externally almost black, and internally, when dry,

reddish brown. It possesses a slightly astringent taste and a strong narcotic odour.

The following is a summary of the constituents found in the authors' analysis :—

	Per cent.
Moisture	14.10
Ash	4.88
Fixed Oil	1.95
Resin . . . . .	.50
Soluble in Absolute Alcohol : tannin, colouring matter	7.64
Soluble in Water : mucilage, tannin, and colouring matter	10.24
Albuminoids	1.90
Soluble in dilute Hydrochloric Acid	4.11
Lignin	52.68
	<hr/> 98.00

Acorus Calamus. M. Thoms. (*Archiv der Pharm.*, June 1, 1886, 465. From *Pharm. Journ.*) The rhizome of *Acorus Calamus* was examined in 1867 by Faust, who reported that he extracted from it the bitter principle as a semi-fluid, brownish glucoside, containing nitrogen; but he failed to obtain it in a crystalline form, or even as a solid. In attempting to prepare this substance by the tannic acid method, Flückiger and Hanbury obtained only a minute quantity of a very bitter substance, which however, was perfectly crystalline. The investigation has recently been renewed by the author, who taking advantage of the property possessed by charcoal of absorbing bitter substances, has attained more definite results. A quantity of perfectly dry rhizome, cut small, was macerated for two days with five times its weight of distilled water; the liquor was then strained off and the residue pressed, after which the marc was stirred with a fresh quantity of distilled water, and again pressed. The united filtrates were allowed to digest for two days with freshly washed and ignited animal charcoal, with frequent shaking, at the end of which time the liquor was entirely deprived of bitterness. The charcoal was washed on a filter with water as long as the filtrate showed any turbidity, then after being dried on a water-bath, it was boiled with 90 per cent. alcohol; the alcoholic extract was filtered, the alcohol distilled off, and the turbid residual liquor shaken with ether. Upon evaporation of the ether, and drying over sulphuric acid, the bitter principle was obtained as a thick, clear, honey-yellow balsam, neutral in reaction, and with

a faintly aromatic odour and very bitter aromatic taste. It was insoluble in water, dilute acids and alkalies, but perfectly and easily soluble in absolute alcohol, methylic alcohol, ether, benzol, toluol, chloroform, carbon bisulphide, and acetone. The yield of this body, which has been named "acorin," and is represented by the formula $C_{36}H_{60}O_6$, was only 0.1854 per cent. When treated with dilute acids and alkalies in a current of hydrogen, acorin splits up into essential oil of calamus, and a sugar; but when the reaction takes place in atmospheric air, the oil readily oxidizes, and is converted into a neutral resin, acoretin, identical with the resin occurring in the rhizome. This resin, when reduced in an alkaline solution by nascent hydrogen, gives the essential oil and sugar as final products. From the extract remaining after shaking out the acorin with ether, was separated a small quantity of a strongly basic crystalline alkaloid, soluble in alcohol, chloroform, and acetone, and insoluble in water and ether. It has been named "calamine."

Hamamelis Virginica. Drs. J. Marshall and H. C. Wood. (*Therap. Gaz.*, May 1, 1886. From *Pharm. Journ.*) With a view to ascertain whether any, and if so, which, constituent of the *Hamamelis virginica* is entitled to be credited with the results attributed to preparations of this drug, an investigation with preparations of the root was undertaken by the authors. They report that it contains no alkaloid, and does not exercise any special physiological influence on the vascular system. The results which have been obtained with the liquid extract in some cases of hæmorrhoids and varicose veins, they are disposed to attribute to the large percentage of tannic or gallic acid occurring in that preparation; and as this would not occur in distillates, they are inclined to think that the virtues of the distilled preparations must depend upon the alcohol they contain and the faith they inspire. It is not quite clear, however, why, for the purposes of this investigation, the root was used. The early reputation of the drug appears to have been based upon decoctions and infusions of the bark, though only the leaves have yet been made official in the United States Pharmacopœia; whilst it has been stated that the distilled extract is prepared from the twigs, freed from leaves (*Pharm. Journ.* [3], xiii. 524). Nevertheless, the conclusions of the authors agree with those of Dr. Grey, published a short time since (*Pharm. Journ.* [3], xv. 890).

Homeriana: a New Remedy for Chest Complaints. (*Lancet*, 1885, 658.) Homeriana is the root of *Polygonum aviculare*, or

knot-grass; it is very common in Russia, and is much used by the people. Dr. Rotschinin has examined and reported on the drug in a paper read to the recent congress of Russian doctors. It has been found by Werner to contain a large proportion of alkaloid. A decoction, however, was used by Dr. Rotschinin, a tumberful being given three times a day. It appeared to be really valuable in several cases of bronchitis, two of which were capillary; also in three cases of whooping cough. It was tried in phthisis, but no definitely satisfactory results were obtained.

P. aviculare has hitherto had but small repute as a mild astringent, and has been used as a vulnerary and styptic; it is understood to owe its properties to tannin.

The North American Aconite. J. U. Lloyd and C. G. Lloyd. (*Pharm. Rundschau*, 1885, iii. 231.) Of the many kinds of aconite growing in the States, two species are of interest—viz., *A. uncinatum* and *A. Fischeri* Reichenbach. *A. uncinatum* grows on the banks of the mountain streams of the Alleghanies. The stem is 6–1.5 m. high. It is identical with *A. ferox* of the Himalaya Mountains; but whereas this plant is rich in aconitine, the other contains only traces. *A. Fischeri* is the only American source of aconitine for medicinal purposes. This species grows on the mountains bordering the coast, at a height of from 2,500–3,500 m. The stem is 1–1.5 m. high. The root resembles *A. napellus*.

Non-Poisonous Indian Aconite Tubers: Wakmah. Y. Shimoyama. (*Pharm. Journ.*, 3rd series, xvi. 86.) W. Dymock, in his "Vegetable Materia Medica of Western India" (pp. 4, 6), describes two species of non-poisonous aconite tubers from India: "atees" (Hindustani and Bombay dialects), the tuber of *Aconitum heterophyllum*, Wall., and "bikmah," "bishma" (Hindustani and Sanskrit), or "wakmah" (Bombay). Royle mentions *Aconitum palmatum* as the mother-plant of "wakmah," but this the author considers in the highest degree improbable, because that plant, according to Hooker and Thomson ("Flor. Indica," i., 54, 58), is poisonous. A specimen of "wakmah," obtained through Dr. Dymock, was handed over to the author by Professor Flückiger for examination.

These tubers were of a slender turnip shape, two to seven centimetres long, four to eight grams in weight, light brown, more or less curved, longitudinally wrinkled, mostly cut off at each end, so that only in one specimen could the traces of the stem and the point of attachment of the new root be recognised. The adventitious roots had been partially removed, and only their remains or

scars were still distinguishable. From the tubers of *Aconitum heterophyllum*, those of "wakmah" differ only in being light-brown externally, poorer in unremoved adventitious roots, and more irregular in form than the "atees" tubers. In anatomical characters the two correspond. The alkaloid separated from this tuber by the author proved to be identical with atesine from *A. heterophyllum*. It is possible, therefore, that the "wakmah" tubers are also derived from the species named. The slight purely external differences are probably referable to the "wakmah" tubers being the older. The respective plants in their parts above ground may represent different species, but at present the author is unacquainted with a second non-poisonous *Aconitum* from India.

New Constituents of Atropa Belladonna. H. Kunz. (*Archiv der Pharm.* [3], xxiii. 722-735.) The occurrence of a fluorescent compound in belladonna has been repeatedly noticed. The author has found this compound both in the extract of the root and of the leaves and stalk; the root extract was acidified until all fluorescence disappeared, and then agitated with ether. The brownish yellow residue left on evaporation of the ethereal solution consisted of microscopic prisms, having an acid reaction. By washing with cold ether, a non-crystallizable, bitter mother-liquor was separated, which was reserved for further examination. The crystals were purified by repeated treatment with boiling absolute alcohol, which finally yielded small clusters of light yellow, four-sided, highly refractive, rhombic prisms. This substance the author names provisionally *chrysotropic acid*, $C_{12}H_{10}O_5$. It melts at 201.5° , resolidifies at 182.6° . When carefully heated, the acid sublimes without decomposition; but when more strongly heated, burns with a luminous flame, leaving no residue. It is soluble in 70-80 parts of hot water, sparingly in cold water and in ether, more soluble in alcohol and acetic acid. The concentrated aqueous and alcoholic solutions are pale yellow by transmitted light, but by reflected light show a beautiful emerald-green fluorescence; dilute solutions give a bluish fluorescence. The crystals dissolve in alkalis or alkaline carbonate solutions, yielding splendid bluish green fluorescent solutions. An aqueous solution, when treated with potassium permanganate, gives a green liquid showing a strong indigo-blue fluorescence. Ferric chloride gives an emerald-green coloration, changing to cobalt blue. The lead and copper salts were examined and described. From the formula and reactions of the substance, the author infers a near relationship to hydroxynaphthaquinone.

Leucotropic acid, $C_{17}H_{32}O_5$, is obtained from the bitter mother-

liquor previously mentioned; it crystallizes in clusters of microscopic prisms, having a satin-like lustre; it melts at 73.8° , and resolidifies at 60.2° . It is insoluble in cold, but somewhat soluble in boiling water; it is nearly insoluble in cold, but readily soluble in boiling ether and in alcohol. Qualitative examination indicates that the compound belongs to the fatty acid series.

The author also found about 0.6 per cent. of succinic acid in belladonna extract prepared from the herbaceous part of the plant.

The Fluorescent Constituent of Atropa Belladonna. H. Pasch-
kis. (*Archiv der Pharm.* [3], xxiii. 541-543, and [3], xxiv. 155-158.) This substance answers to the formula $C_{10}H_8O_4$, and seems to be identical with scopoletin, obtained by Eykman from *Scopolia japonica*. It was extracted as follows:—10 kilos of ripe belladonna berries were extracted with strong alcohol, the solution evaporated to dryness, the residue taken up with hot water, and the acid liquid thus obtained agitated with chloroform. The residue obtained on evaporation of the chloroform extract was recrystallized from hot concentrated alcohol, from 40 per cent. alcohol, and finally from water. The yield is only about 0.001 per cent. When pure, the substance crystallizes in yellowish white, slender needles, seemingly rhombic pyramids; it melts at $197-198^{\circ}$. It dissolves sparingly in cold water and in ether, more easily in hot water, chloroform, and in concentrated alcohol, and very easily in hot alcohol, ethyl acetate, acetic acid, and alkalies. Amyl alcohol and benzene extract it from its aqueous solution. The aqueous solution reacts faintly acid; the aqueous, alkaline, and especially the ammoniacal and alcoholic solutions, show a splendid blue fluorescence. The fluorescence disappears on adding acids, but alkalies cause its reappearance. The sulphuric acid solution when nearly neutralized with ammonia shows a fine purple-violet colour by reflected light, but is colourless by transmitted light. The aqueous solution gives a beautiful blue precipitate with gold chloride, and a green one with iron chloride; alkaline copper solution and ammoniacal silver nitrate solution are reduced on warming. In slightly concentrated nitric acid the substance dissolves with a yellow colour, which becomes blood-red on the addition of ammonia (reaction of *æsculin* according to Sonnenschein).

Contribution to the Knowledge of Sandal Woods. A. Petersen. (*Pharm. Journ.*, 3rd series, xvi. 757-761.) This paper contains descriptions and woodcut illustrations of the microscopic characters of the various drugs known under the name of sandal wood.

Reference should be made to the original article, which is not suited for condensation.

Sandal Wood. W. Kirkby. (*Pharm. Journ.*, 3rd series, xvi. 857-860, and 1065-1067.) The author deals with the histology of this wood, and furnishes descriptions and woodcut illustrations of the microscopical characters of Macassar, West India, and Venezuela sandal woods. Since his report cannot be condensed without materially impairing its usefulness, the reader is referred to the original articles.

Piscidia Erythrina (Jamaica Dog-Wood). (*Der Fortschritt*, Feb. 5, 1886. From *Pharm. Journ.*) This drug has only recently been introduced as a remedy. It was first analysed in 1881, by J. Ott, of Philadelphia, and by Nagle, who pointed out its narcotic action on certain animals, although Hamilton, of Plymouth (U.S.A.), had already, in 1844, recognised its anodyne properties. Ford, in 1880, proposed it as a remedy in neuralgia. Ott's and Nagle's investigations were rapidly followed by numerous experiments; and Firth, James, Scott, MacGrotz, Sifert, of Berlin, and Vanlair, of Liege, published their observations on the therapeutic qualities of the *Piscidia*. Landowsky, in 1883, first introduced it into France as an anodyne and narcotic. Huchard prescribed it, combined with *Viburnum prunifolium*; and the author of this paper, assisted by Dr. Legoy (De Houilles), instituted in the laboratory and in the wards of the Hôpital Cochin a great number of experiments on its physiological and therapeutic properties.

The *Piscidia erythrina*, a shrub of the natural order *Fabiaceæ* is a native of South America and the West Indies, especially of Martinique. It takes its name from the stupifying effects of its bark on fishes, which are analogous to those of the Levant-nut, and from the bright red colour of its blossoms. The bark is known in America by the names "Jamaica dog-wood" and "Bois de chien."

The bark of the root, which is exclusively employed, contains, according to Carette's analysis, a resin, a kind of turpentine, fecula, an ammonia compound, and an alkaloid (picrotoxine), which Bruel and Tanret first succeeded in extracting from the root. This alkaloid, however, is not constant, and its presence in larger or lesser proportions, or its absolute absence, depends upon the locality where the plant has been found. This materially influences the general therapeutic value of the dog-wood, and the place whence the drug has been procured must be ascertained and specified in the prescription. There is another point which ought

to be borne in mind, viz., that the physiological action of the *Piscidia* is different in warm- and in cold-blooded animals. The former will be but feebly acted upon, even by large doses; whilst in the latter, after a few seconds, the most violent effects will become manifest. On experimenting with *Piscidia* on a frog, the movements of the animal almost immediately become convulsive, an exaggerated frequency of the pulse and the cardiac action will be produced, followed by tetanus, and finally by death. *Piscidia* seems to act almost exclusively on the grey matter of the medulla oblongata and the spine, as well as on the ganglia.

Piscidia erythrina is used in form of a powder, of a fluid extract, and of a tincture. The author of this paper employed in preference the latter. It may be prescribed as follows:—Fluid extract of *Piscidia erythrina*, 15 grams (5ss.); syrup of bitter orange peel, 250 grams (3viiij.) Each teaspoonful will contain 1 gram (15½ grains) of the extract, and 3–7 teaspoonfuls of the syrup a day may be given; of the tincture, 40–50 minims are the daily dose.

Until quite recently, *Piscidia* has been considered as a hypnotic. Experience leads the author to the opinion that it principally acts as an anodyne, and that sleep is not its specific immediate effect, but only rendered possible in consequence of the cessation of pain.

Hamilton's first trial, in 1844, perfectly confirms this view. He suffered from violent toothache, which nothing could allay. After applying the tincture of *Piscidia* on cotton wool to the tooth, marked relief took place. This induced him to take internally a few drops of the tincture, after which the pain perfectly ceased and profound sleep ensued.

The preparations of *Piscidia* prove beneficial principally in neuralgia, and the author rapidly cured several cases of obstinate brachial or facial neuralgia. He prescribes exclusively the Jamaica *Piscidia*, which, of all kinds, is the most active; and uses the tincture, of which he gives 30–40 minims a day. Of the American fluid extracts, and of those prepared by Limousin, in France, 3–4 grams (46–60 grains) a day may be taken, either pure or in a mixture.

The Medical Properties of Two Rhamnus Barks. G. W. Kennedy. (*Amer. Journ. Pharm.*, October, 1885, 496–500.) The author gives a full account of an investigation undertaken by him with the object of studying the difference in the laxative action of *Rhamnus Purshiana* and *Rhamnus catharticus*. He arrives at the conclusion that *Rhamnus Purshiana* is decidedly the more active of the two.

Cascara Sagrada. (From the *Therapeutic Gazette*.) Although the various species of *rhamnus* contain nearly the same active principles, they differ in their medicinal action. *Rhamnus frangula*, administered in the form of a decoction, is very popular as a mild laxative. The common buckthorn, or *Rhamnus catharticus*, is much more active, rather drastic in its effects, and is regarded as a hydragogue cathartic. Intermediate between these in medical activity stands the species *R. Purshiana*, or cascara sagrada. Its action as a laxative is always prompt and without the least tendency to cause "griping." Indeed, we have no remedy which can be relied upon, where vegetable laxatives are indicated, to act as efficiently as cascara sagrada, without causing disagreeable disturbances or engendering undesirable symptoms requiring a constant resort to purgatives. Its value is especially apparent when administered to correct these symptoms (termed "habitual constipation") in small and repeated doses. In common with other drugs of similar character, cascara sagrada has frequently been discarded as an unreliable agent, because failing to act in special cases where any other vegetable cathartic would also have failed to be of service. To obtain the best results from the remedy, the bark must be neither too young nor so old as to bear an excess of cork, and must be of comparatively recent collection. A great deal of cascara sagrada, as found in the market, is almost worthless. Preparations from the bark—the fluid extract, for example—should be prepared with a menstruum sufficiently aqueous to extract the principles soluble in water, and yet at the same time of sufficient alcoholic strength to extract the resins soluble in alcohol, and to prevent these from precipitating in the finished extract. From the fact that the constituents of the bark are so complicated, liquid preparations from it frequently precipitate, and their activity correspondingly diminishes. A concentrated preparation in the dry form may possibly be prepared from it, bearing the same relation to the drug, and produced by the same method, as in resin of podophyllin. This would be a very desirable preparation, and might be termed "rhamninn," which would be more appropriate than "cascarin."

Constituents of Cascarilla Bark. Dr. Boehm. (*Pharm. Post*, October 24, 1885.) Cascarilla bark has long been known to contain an inert essential oil, and the crystalline bitter substance cascarrillin. The author now shows that in addition to these constituents, the bark contains an alkaloid closely allied to choline.

Astringent Barks. C. Counciler. (*Dingl. polyt. Journ.*, cclv. 483-488.) According to the author, mimosa bark from Tasmania (I. and II.), and Portland in Victoria (III. and IV.), gave by analysis:—

	I.	II.	III.	IV.
Solid Matter	88·65	91·75	88·25	90·75
Tannin readily soluble . .	15·05	19·93	16·54	12·70
Tannin sparingly soluble .	3·83	3·18	4·66	3·60

The bark of *Quercus castanea*, which is brought into Europe from North America in the form of compressed bales, contains from 8 to 9 per cent. of tannin. The coarse bast fibres contain 4·73 per cent. of tannin, which was readily soluble, and 1·92 per cent. of sparingly soluble tannin; the finer particles show 86·5 per cent. of solid matter, and 9·35 per cent. of total tannin.

The bark of the stem as well as the roots of the kermes oak (*Quercus coccifera*), cultivated in the south of France and the north of Africa, is largely employed as a tanning agent. The bark of the roots is known under the name of *garouille*, or African bark. It contains in an air-dried condition 90 per cent. of solid matter, 7·88 per cent. of soluble, and 0·81 per cent. of sparingly soluble tannin.

Birch-bark from Friedrichsruh contains 3·98 per cent. of soluble and 0·97 per cent. of difficultly soluble tannin.

Alder-bark from the province of the Riesenthal has the following composition. 100 parts contain:—

Time of felling.	Age in years.	Air-dried Substance.				Dry Matter.		
		Dry Matter.	Tannin.			Tannin.		
			Readily Soluble.	Sparingly Soluble.	Total.	Readily Soluble.	Sparingly Soluble.	Total.
May, 1882 .	39	82·00	11·15	0·53	11·68	13·60	0·65	14·25
Dec., 1882 .	39	89·30	5·35	2·03	7·38	5·99	2·27	8·26
May, 1883 .	39	93·20	6·02	2·15	8·17	6·46	2·31	8·77
„ 1882 .	19	89·50	11·82	0·71	12·53	13·21	0·79	14·00
„ 1883 .	19	88·33	8·93	2·22	11·15	10·11	2·51	12·62

Russian willow-bark from one year old osiers contains in 100 parts:—

Bark of <i>Salix</i> .	Air-dried Substance.				Dry Matter.		
	Dry Matter.	Tannin.			Tannin.		
		Readily Soluble.	Sparingly Soluble.	Total.	Readily Soluble.	Sparingly Soluble.	Total.
Purpurea. . . .	92.2	0.86	0.86	1.72	0.93	0.93	1.86
Viminalis . . .	92.1	2.14	1.28	3.42	2.32	1.39	3.71
Purpurea × viminalis	91.3	2.70	2.01	4.71	2.96	2.20	5.16
Capisca	86.6	1.34	1.28	2.62	1.60	1.53	3.13
Amygdalina. . .	92.5	2.27	0.90	3.17	2.45	0.97	3.42

Copalchi Bark. M. E. Schmidt. (*Répertoire de Pharm.*, 1885, 157.) This bark was first brought into Europe under the name of Trinidad or Cuba cascarilla. The author finds this bark to contain a resin and a bitter principle, soluble both in water and alcohol. The aqueous infusion of the bark has a yellowish, and the alcoholic a brown, colour. A careful description of the physical and microscopical characters of the bark is also given.

A New Medicinal Application of Quebracho. H. J. Wegner. (*Amer. Drugg.*, April, 1886.) Fluid extract of quebracho is said by the author to be capable of relieving the asthma caused in many persons by handling powdered ipecacuanha.

Notes on a Visit to the Dutch Government Cinchona Plantations in Java. H. B. Brady. (*Pharm. Journ.*, 3rd series, xvi. 485-491.) The account given by the author is a most interesting one; but as it does not admit of condensation without losing much of its interest, we must confine ourselves here to calling the reader's attention to it, and referring him to the above source.

Mode of Assaying Cinchona Bark by Hydrochloric Acid. Dr. J. E. de Vrij. (*Chemist and Druggist*, August 15, 1885.) 20 grams of finely-powdered bark are treated with hydrochloric acid and water, whereby *all* the alkaloids are dissolved. The quantity of percolate which it is necessary to pass through the marc is usually from 180 c. c. to 200 c. c., which quantity will rarely be exceeded if the percolation has been successfully conducted. The estimation of the amount of alkaloids in this acid solution may be made in either of the following ways, viz. :—

1. The acid solution is precipitated by a *large excess* of caustic soda, which throws down a curd-like *white* precipitate. The precipitate is collected on a double filter, and washed until the filtrate

is nearly colourless. The whole of the filtrate is measured, and compensation made by adding to the weight of alkaloid, to be presently ascertained, 0.0585 gram for every 100 c. c. of the mother-liquor at a temperature of 15° C. The drained filter is carefully dried upon blotting-paper until the precipitate ceases to adhere, when it may be easily detached without loss, and transferred to a small tared dish. It is now dried over a water-bath until it ceases to lose weight, and the weight is ascertained. Add the compensation above indicated for the mother-liquor, multiply the sum by five, and the product is the percentage of alkaloids in the bark under examination.

The alkaline mother-liquor may now be used for ascertaining indirectly the percentage of cinchotannic acid. After exposure for two or three days in a shallow dish, by which the cinchotannic acid becomes converted into cinchona red, the liquid is heated, and hydrochloric acid cautiously added to slight acid reaction. After cooling, the now turbid liquor is filtered through a double filter, to collect the very voluminous precipitate of cinchona red. The precipitate is washed, dried, and weighed, the second filter being used as a tare. By multiplying the ascertained weight of cinchona red by 1.2, a close approximation to the weight of cinchotannic acid is obtained, from which its percentage may be calculated, and it will be seen that the quantity of cinchotannic acid in different species of cinchona, and even in different samples of the same species, varies considerably.

2. The acid solution is mixed with excess of caustic soda, as before, and well shaken in a bottle with 1 litre of commercial benzol, and left standing for not more than five minutes, for the benzol, which now contains the alkaloids in solution, to separate. The benzol solution is now decanted on a filter previously moistened with benzol, and the remainder is poured into a separating funnel. After sufficient time for separation, the red alkaline liquor is drawn off into the bottle previously used, and shaken with another 200 c. c. of benzol, to remove possible traces of alkaloid, and this benzol solution is also filtered and added to the former. The amount of alkaloids contained in the mixed benzol solutions may now be determined, either directly or indirectly, in the manner following, viz. :—

Direct Determination.—The benzol solution is shaken with 30 c. c. of very dilute nitric acid, the acid solution is drawn off, and replaced by 20 c. c. of water, which is again shaken and added to the first. The liquors are heated to drive off traces of benzol, and

when cool transferred to a separator, and shaken with 200 c.c. of ether and an excess of caustic soda. In this way *all* the alkaloids are dissolved by the ether, leaving generally a slight brown film on the surface of the alkaline liquor, *which is almost entirely soluble in chloroform*. After separating the ethereal solution, a further 100 c. c. of ether is shaken with the alkaline liquor, and is then added to the first. By distillation of the ether, the whole of the alkaloids are left in a state of greater purity than the author has ever obtained them by any other process.

Indirect Determination.—The benzol solution is well shaken with 70 c.c. of decinormal sulphuric acid. The acid solution is drawn off, and replaced by 30 c. c. of water, which is again shaken and added to the other. The aqueous liquors are heated, and *accurately* neutralized by decinormal solution of caustic soda, until the colour of reddened litmus is affected by it. The quantity of soda solution required for saturation is now to be deducted from 70 c.c. (the equivalent of 70 c.c. of decinormal sulphuric acid), and the difference, multiplied by $\cdot 031$, is the weight of alkaloid in 20 grams of bark. This product multiplied by 5 gives the percentage.

Example.—Suppose the bark for analysis to contain 5 per cent. of alkaloid—which would be a reasonable standard for pharmaceutical purposes—the acid solution from 20 grams of powder should be neutralized by, say, 37.5 c. c. of soda solution :

$$\text{For } 70 - 37.5 \times \cdot 031 \times 5 = 5.04$$

(the number of grams of alkaloid in 100 grams of bark). The author considers this indirect determination the most simple for those who are accustomed to work volumetric processes.

Fatty Constituents of Cinchona Barks. O. Hesse. (*Liebig's Annalen*, ccviii., 288–298. From *Journ. Chem. Soc.*) The existence of a fatty substance in cinchona bark has been noticed by Lauber, Reichardt, Reichel, and Flückiger. Kerner succeeded in obtaining a crystalline compound, which he termed cinchocerotin. This substance was afterwards examined by Helms (*Archiv für Pharm.*, ccxxi. 229), who ascribed to it the composition $C_{27}H_{48}O_2$. The author finds that this substance is really an isomeride of quebrachol, and does not belong to the same class of compounds as betuline and cerine, as Helms supposed. It is best prepared by extracting the bark with low boiling petroleum. The extract is evaporated, and the residue dissolved in hot alcohol and boiled with charcoal. On cooling, a small quantity of a green amorphous substance is

deposited. After this has been removed by filtration, the solution is allowed to evaporate at the ordinary temperature until it deposits crystals.

By this process the compound *cupreol*, $C_{20}H_{34}O + H_2O$, is obtained from *China cuprea*, in which it occurs to the extent of 0.002-0.005 per cent. It is also found, together with *cinchol*, in the bark of *Cinchona officinalis*, and in *C. calisaya*, var. *Schuhkrafft*. Cupreol bears a close resemblance to quebrachol. It is deposited from alcoholic solutions in glistening plates containing 1 mol. of H_2O , and from ether or light petroleum in anhydrous needle-shaped crystals. The hydrated crystals lose a portion of their water of crystallization at 25° . The solution in chloroform is lævogyrate $[\alpha]_D = -37.5^\circ$. The solution in chloroform gives a blood-red coloration with sulphuric acid. The *acetate* crystallizes in plates (m. p. 126°), freely soluble in chloroform, ether, and hot alcohol. The *propionate* melts at 111° , and in other respects resembles the acetate.

Cinchol, $C_{20}H_{34}O + H_2O$, occurs in all true cinchona barks, but is not found in *China cuprea*. It is most abundant in the bark of *Cinchona calisaya*, var. *Ledgeriana*. It is deposited from alcohol in crystalline plates containing 1 mol. of H_2O . The water of crystallization is partially driven off at 25° . The anhydrous substance melts at 139° , cupreol melts at 140° . The chloroform solution is lævogyrate, $[\alpha]_D = -34.4^\circ$. The *acetate* is deposited from alcohol in white needles which melt at 124° . The *propionate* forms a white powder composed of microscopic plates; it melts at 110° . There is a close resemblance between cupreol, cinchol, and quebrachol; according to the author, these three compounds belong to the class of cholesterins, and cinchol is identical with Liebermann's oxyquinoterpene.

Note on Cinnamon. Dr. Hilger. (*Archiv der Pharm.*, November 1, 1885.) The author has made a number of ash estimations in Ceylon cinnamon. He finds the ash to vary in different samples, between 3.4 and 4.8 per cent. Of this ash the soluble portion is found to vary between 53 and 88 per cent.

Quillaia Bark as an Expectorant. Dr. R. Kobert. (*Therapeutic Gazette*, 1885, 606, from *Centralbl. für Klin-Med.*) The author recommends, as an expectorant, a decoction made with 5 grams of soap-bark and 200 grams of water, of which adults or children may take a dessertspoonful or a teaspoonful, respectively.

The glucosides which give to senega its expectorant properties are said to exist in much greater degree in quillaia bark, and the

use of the latter is said to be preferable, as it causes neither diarrhoea nor vomiting, and is more agreeable in flavour. The decoction is sweetish, and is readily taken by children.

Fraxinus Americana. J. C. Roberts. (*Amer. Journ. of Pharm.*, 1886, 117.) The author obtained the following results with the root bark of this plant:—

1. Moisture, loss by drying at 105° C., 9.63 per cent.
2. Ash, 5.33 per cent. Of this amount 6.25 per cent. were soluble in water, 86.67 per cent. soluble in dilute hydrochloric acid, and the remainder soluble in caustic soda.
3. Benzol extracted 0.67 per cent., containing a little volatile oil. The filtered aqueous solution of the extract gave a precipitate with phosphomolybdic acid; the portion insoluble in water was resin, and dissolved in 80 per cent. alcohol.
4. Alcohol (80 per cent.), yielded a brown, somewhat bitter and acrid extract, which, on being treated with various solvents and chemicals, showed the presence of tannin, alkaloid, resin, and sugar.

5. The remaining constituents found were gummy matter, starch, and colouring matter.

Glucosides could not be detected. The volatile oil was of a yellow colour, somewhat aromatic, and had a rather bland taste. The amount of alkaloid obtained was very small; it refused to crystallize, and was contaminated with colouring matter.

Ailanthus Glandulosa. F. H. Davis. (*Amer. Journ. Pharm.* December, 1885, 600.) The author has subjected the bark of this tree to proximate analysis; it is not stated whether the bark of the branches or of the trunk was used for the purpose.

By desiccation at 100° C., the air-dried bark lost 7 per cent. of moisture, and on incineration yielded 5.92 per cent. of ash; of the latter, 25.8 per cent. was soluble in water (potassium and sodium chloride and phosphate), and the insoluble portion contained calcium, magnesium, and iron as carbonate, sulphate, and phosphate. The bark was successively treated with petroleum benzin, ether, alcohol, cold water, boiling water, and dilute acid; fixed oil, chlorophyll, resin, wax, sugar, tannin, albumen, gum, starch, pectin, oxalic acid, and probably another crystallizable organic acid, soluble in alcohol, were obtained. Distillation with water yielded a trace of volatile oil. Alkaloids and glucosides could not be detected.

Doundaké and its Bark. E. Heckel and F. Schlagdenhauffen (*Journal de Pharmacie* [5], xi. 409, 468; *Pharm. Journ.*, 3rd series,

xvi. 49.) The authors having received further information concerning the doundaké plant, together with flowers, leaves, and branches preserved in spirit, supply the following description:—

Sarcocephalus esculentus, Afzel.—A shrub, with a short, robust, and knotted trunk, gnarled and thickset, like the small Breton oaks, but of less dimensions, sometimes attaining the thickness of a man's leg. In young plants the branches spring from the stocks, forming a loose cluster, and attaining a great length without any ramification, or, at the most, in a very slight and apparently aborted form. The smooth or puberulous shrub occurs sometimes under the aspect of a climbing bush, three to seven metres high. The stem is covered with an unequal rugose, fissured bark, but differing very much in appearance according to the age of the plant and the locality in which it has grown. In the adult state the barks coming from the Rio Nunez differ in appearance from those coming from Sierra Leone. The former have a corky aspect, which explains the name of *Nauclea sambucina* given to the plant by T. Winterbottom. Usually this bark is grey in the young condition, but later is of a more or less deep yellow. The subjacent layers, which separate in thin lamellæ throughout the whole length of the stem, are of a more or less decided orange-yellow colour, but most frequently rather bright. The young branches have a thin, greyish bark, fissured longitudinally, and covered with small blotches, or small bluish, nearly cylindrical, or slightly tetragonal spots. Leaves opposite, coriaceous, slightly acuminate, obscurely narrowed or nearly rounded at the base, with limb entire, glossy, glabrous on both surfaces, slightly assymmetric, undulated, with seven or eight strong nerves on each side, terminating in an arc before reaching the margin of the leaf, shining green below, pale green above, 0·05 to 0·20 m. long; petiole short (0·005 to 0·020 m.), twisted, and rose coloured. Stipules intermediate to the leaves, short, obtuse or slightly acuminate at the summit, minutely ciliate, and of a purple-brown colour. Calyx tubes coherent; calyx-teeth four or five, provided with filiform clavate appendages, caducous, and disappearing rapidly on the development of the corolla. Corolla white or yellowish white, funnel-shaped, much narrowed at the base, slightly fleshy, four to six lobed, and with imbricate estivation. The corolla is caducous, and has an agreeable odour of orange-flowers or honeysuckle. The stamens are inserted in the throat of the corolla, and have a very short filament supporting an elongated anther dehiscent longitudinally. Disc, none, or inconspicuous. Style, brown, filiform,

longer than the corolla-tube, supporting a snow-white stigma thicker than itself. Ovary buried in the syncarpium, with two cells formed by septa that never unite completely. Syncarpic fruit, 0.062 m. to 0.08 m. in diameter, globular, with small parietal cells, separated by membranous septa, reddish black to brown when mature, with a fleshy core occupying one-fourth of the diameter of the fruit. Seeds small, whitish, ovoid, smooth. Old plants are said to produce a gum, a specimen of which is in the museum at Kew.

The *Sarcocephalus* is distributed widely in Africa, from Senegal to the Gaboon, especially in Senegambia, Dakar, Casamance, Rio Nunez, Iles-de-Laos, Rio Pungo, Sierra Leone, Upper Guinea, Monrovia, and the Niger. In Sierra Leone the natives call the fruit the peach or fig of the country. At Dakar it is sold commonly in the markets, being obtained from a neighbouring locality called Hann, where the plant grows spontaneously in abundance. The tree flowers in May, June, and July, and the fruit is ripe in October. According to Schweinfurth, the fruit may be compared to a strawberry, but its odour is rather that of the apple. Eaten in excess, it acts as an emetic. The plant prefers the neighbourhood of the sea-coast, but it is also met with in the interior. Schweinfurth says it occurs in the Nile region, and also that it is cultivated in the north of Guinea.

The bark being the only part of the plant employed in medicine, the authors have submitted it to a close examination, and give a number of histological details, for which the source above quoted should be referred to. It appears from their observations that doundaké bark, from whatever source, presents first a suber layer, and secondly a cellulous parenchyma with sclerous elements. The layers in the primary bark, referred to as the lacunous parenchyma, the dense parenchyma, the intermediate zone and the soft liber, disappear with the primitive epidermis. It is thought probable that these primary layers, at first much reduced by compression due to the secondary development of cellular parenchyma, become atrophied or crushed against the wood, and remain adherent to it when the bark is removed.

The authors distinguish between two forms of this drug, differing in aspect, if not in chemical composition and structure; one of these comes from Boké (Rio Nunez), and the other from Sierra Leone.

The Sierra Leone bark, from adult branches, is externally greyish and fissured, but has a general smooth appearance on the

surface, with here and there small hard excrescences of a darker colour. As the branches become older the fissures multiply and the suber cracks in plates; the colour moreover deepens, so that the blackish excrescences, which also become multiplied, are lost in the general yellow colour predominant in the bark; some plates of grey suber are, however, still noticeable. The very old barks are rougher still; the fissures multiply in every direction, especially around the black excrescences, which become larger, and the underlying yellow cellular parenchyma becomes exposed to view by the removal of the suberous plates, which assume a russet-grey appearance and fall into a reddish powder. The interior of the bark is of a yellow-ochre colour, and the surface is striated longitudinally. The cellular parenchyma, which constitutes the greater part of the bark, separates easily in thin flakes of uniform thickness. The taste of this bark is markedly bitter, resembling that of quinine, or perhaps better comparable to that of quassia amara. It is localized in the yellow tissue of the parenchyma with sclerous elements. The suber, easily separable in square flakes, owes its astringency to the tannin it contains; it has no bitterness.

The Boké bark derived from full grown branches resembles the preceding externally, but in that taken from branches and stems, the suber rapidly assumes an ochry colour, and becomes spongy and pulverulent; it is much smoother than the Sierra Leone bark, and free from the blackish excrescences. The internal surface is a deeper yellow, but it has the same lamellar fibrous structure. The suber is less astringent, as it contains less tannin; the cellular tissue has a clearer, more decided and less ochreous yellow colour; the taste is rather more bitter. There is the same anatomical structure in the two barks.

The doundaké barks frequently arrive from the coast of Africa mixed with barks from the *Morinda citrifolia* and another species of *Morinda*, which the authors suggest might, if it proves to be a new species, be named *M. Doundaké*. These barks resemble doundaké bark in many respects, and are said to be used by the natives for the same purposes; but they may easily be distinguished by a histological examination.

As a result of an earlier examination of doundaké bark, Messrs. Bochefontaine, Ferris, and Marcus had announced that they had succeeded in isolating an alkaloidal substance crystallizing in rhombohedric form, and soluble in water and in alcohol. This body, which they named "doundakine," was described as being obtained by exhausting the bark with dilute sulphuric acid, filter-

ing the extract, adding excess of lime, evaporating to dryness, and exhausting the residue with alcohol. They also described the result of some physiological experiments made with this substance. The authors of the present paper operating in a similar manner obtained a substance which gave the same physiological results when administered to frogs and guinea pigs, but did not correspond to the chemical and physical characters attributed to "doundakine." It is true that it was precipitated by the double iodides and the phosphomolybdate and phosphotungstate of sodium; but it was devoid of alkaline reaction, did not combine with acids, and could not be obtained in the specific crystalline form. The authors therefore operated upon the bark with a series of solvents after the manner laid down in Dragendorff's "Plant Analysis."

From their results they consider themselves justified in stating:—

1. That "doundakine," as a crystallizable alkaloid, does not exist, but it is suggested that the name might be appropriated for the colouring matter to which the bark owes its physiological action.

2. That the bitterness of doundaké bark is due to two colouring principles of a resinoid nature, both containing nitrogen, one soluble in water and the other in alcohol. These active principles are contained both in the Boké bark and in the bark from Sierra Leone.

3. That the barks yield another principle, tasteless, insoluble in water, but soluble in caustic potash, as well as glucose and traces of tannin.

The authors recommend the use of a dilute spirit in making a preparation of doundaké bark for therapeutic purposes. In their experience the best results have been obtained in using 60° alcohol, which gave a dry extract equal to 21 per cent. of the bark. The use of a hydro-alcoholic menstruum is also in conformity with the practice of the natives, who macerate the bark in wine. In this form it has been reported to be a good substitute for cinchona bark, especially as it is better tolerated by the stomach for a long time. The authors, however, are disposed to accord to doundaké bark a secondary place, similar to that occupied in relation to cinchona bark in South America by the barks of *Zanthoxylum caribæum* and *Z. Perrottetti*. There appears to be no doubt that doundaké bark possesses astringent and tonic febrifuge properties, but the authors consider there is no absolute justification for its designation as "quina africana" or "quina de Rio Nunez."

Nicotiana Persica. E. M. Holmes. (*Pharm. Journ.*, 3rd series, xvi. 681, 682.) The author publishes some notes on the Persian *tumbeki* or *teymbeki*, which consists of the leaves of the above species, and of which the Shiraz variety is the most esteemed, those of Kechan and Teheran being about one-half the value of the former. The species closely resemble *N. Tabacum*, but its leaves are acute rather than acuminate, and its corolla is club-shaped, has a spreading limb, and is white inside and greenish outside. Teymbeki is smoked in a special apparatus, a kind of water-pipe, called *narghileh*, from its resemblance in shape to a cocoanut (narghil), the teymbeki being placed in a small reservoir on the top, and the vapour drawn through a tube which passes to the bottom of the water; it collects above the water and is then inhaled through a long tube.

Constituents of Tumbeki (Nicotiana Persica). E. J. Eastes and W. H. Ince. (*Pharm. Journ.*, 3rd series, xvi. 682, 683.) The authors have made a chemical investigation of different varieties of this tobacco, and obtained the following results:—

	Ispahan.	Hidjaz.	Kechan.	Shiraz.
Nicotine	5.4945	2.046	2.909	5.835
Saccharoid Matter . .	2.64	2.85	5.58	3.555
Matter soluble in water .	42.0	42.3	39.9	55.6
„ insoluble in water	58.0	57.7	60.1	44.4
Ash	22.0	28.5	28.5	26.15

Lobelia Nicotianæfolia. Dr. V. Rosen. (From *The Lancet*.) The author recognises two alkaloids in *Lobelia nicotianæfolia*: one liquid, corresponding to the lobeline obtained from *L. inflata*; the other solid, crystalline, and soluble in chloroform. The second has also been discovered in *L. inflata*. The solid alkaloid and the hydrochlorate and sulphate of lobeline correspond in their pharmacological characteristics, and resemble apomorphia in their power to cause vomiting.

Ambrosia Artemisiæfolia. Dr. J. H. Hill. (*Amer. Journ. Pharm.*, 1886, 300.) Attention has recently been directed to this common plant, known as ragweed, in the *North Car. Med. Journ.*, by the author, who found it very serviceable in persistent bleeding of the nose, a strong infusion of the plant being given in table-spoonful doses every half-hour, and a plug made of the leaves being inserted into the nostril. According to the “National Dispensatory,” the astringency of the plant has caused it to be used in

moderate discharges of blood and mucus, and to palliate mercurial salivation.

Coca at the Source of Supply. Dr. Squibb. (*Pharm. Journ.*, 3rd series, xvi. 46-49, from *Ephemeris*.) An interesting report not suited for abstraction. Reference should be made to the source quoted.

Notes on the Properties of Coca and Cocaine. Prof. Bignon. (*Pharm. Journ.*, 3rd series, xvi. 265.) The following notes have been communicated to *Les Nouveaux Remèdes* as the conclusions arrived at by the author, who states that he has for a considerable time studied the properties of coca in Peru. His experience is not in accord, upon certain points, with generally received ideas, but for the same reason his conclusions possess interest, and the more so as they are attributed to investigations made upon fresh coca and in the country where it is grown.

1. In fresh coca leaves, or in recently dried leaves that have not undergone any fermentation, there exists only one inodorous crystallizable alkaloid, cocaine.

2. Coca leaves, exhausted completely of their natural alkaloid (cocaine), and submitted to the action of alkalies at a temperature of 100 C., yield upon distillation a new volatile base, having a very strong odour, hygrine.

3. Hydrochloric acid, even dilute, acts slowly upon cocaine, decomposing it partially. Solutions also that are not absolutely neutral undergo a commencement of decomposition; they become odorous, slowly yield a crystallization, and leave a syrupy mother-liquor.

4. There are few alkaloids so sensitive as cocaine to physical and chemical action. This ought always to be borne in mind in all manipulations to which it is submitted.

5. Coca leaves dried in damp weather, or pressed into sacks before being completely dried, undergo a fermentation that destroys the cocaine. The destruction goes on gradually until the complete disappearance of the alkaloid.

6. The fresh leaves, or leaves freshly dried in the open air in fine weather, with frequent turning, and sheltered from moisture and dew, yield easily eight grams per kilogram, and the finer sorts can give ten grams and upwards in exceptional cases and on the spot where they are grown.

7. The anæsthetic properties of the alkaloid are attenuated in the salts. The best therapeutic results are always those that are obtained with the pure alkaloid.

8. Contrary to generally accepted opinions, the author believes

that the irritation produced by the alkaloid is due to the cocaine, and not to hygrine. It appears to him more reasonable to admit that a rather energetic base like cocaine should irritate, than to suppose that this irritation should be due to one or two thousandths of hygrine, which would be the maximum quantity contained in pure cocaine.

9. He believes, also, that the dilatation of the pupil is a property inherent in cocaine and attenuated in its salts.

10. The author thinks that solutions which do not produce this dilatation have undergone a commencement of decomposition, and contain a derivative body, unfortunately easily produced, which is very soluble in water, and uncrystallizable; this body seems to resemble a glucoside.

11. A Peruvian Indian chews about three hundred to five hundred grams of coca in a week, the coca containing five to six grams of cocaine per kilogram. He therefore absorbs two to three grams of cocaine per week, the daily dose being thirty to forty centigrams. Taking into account the tolerance acquired through a habit taken up in early childhood, a dose of ten centigrams per day should be considered a good average for internal administration. It follows, therefore, that doses of cocaine such as are frequently indicated, which do not exceed one or two centigrams, must be considered as illusory. The action of cocaine upon the mucous membrane of the stomach is far from being perfectly known.

12. Coca contains the cocaine in the state of an inert salt, which is without special therapeutic properties. The employment of coca by the Indians, which has served as a guide for conclusions as to its tonic, stimulant, and nutritive properties, has been badly observed, and the deductions that have been drawn are fallacious. The Indian never chews coca alone; he mixes it with lime and ash, that is to say, with strong bases that isolate the cocaine. It is in this that the desired anæsthetic properties and the numbing effect upon the mucous membrane of the stomach are found. None of the special properties attributed to the leaves really exist; the leaves are neither nutritive nor tonic, and they possess no other properties than those attributed generally to aromatic resinous plants.

13. For general external use (burns, catheterism), and even for eye maladies, cocainated vaseline seems to the author preferable. For internal use and sprays, he recommends a five per cent. alcoholic solution of the alkaloid.

Constituents of Erythroxyton Coca. C. J. Bender. (*Chem. Centr.*, 1885, 490-493.) The author has subjected the leaves of the coca-plant (*Erythroxyton Coca*) to a careful investigation. Besides cocaine, he obtained an amorphous alkaloid, to which he gives the name "cocaïcine," and a volatile base which he names "erythroxyline." There also seem to be one or two other alkaloids present, but the author was unable to obtain them in a pure state, or to determine whether they were present in the fresh leaves or formed during the process of extraction.

Folia Pimentæ. W. W. Abell. (*Amer. Journ. Pharm.*, 1886, 163.) The leaves of *Eugenia Pimenta* are petiolate, and vary somewhat in shape and size, but are usually about four inches long, elliptical, entire, blunt or obtusely pointed, veined, of a shining green colour, and have an astringent and aromatic taste.

On distilling 448 grams of the ground leaves with water for thirty-six hours, the distillate treated with ether yielded only half a fluid drachm—or rather less than $\frac{1}{2}$ per cent.—of volatile oil, resembling that of *Myrcia acris*. The estimation of tannin was attempted by precipitating the concentrated infusion with basic lead acetate, decomposing the precipitate with sulphuretted hydrogen, and evaporating, which gave 0.417 per cent. The ash amounted to 11.25 per cent., one-eighth of which was soluble in water.

The following pharmaceutical preparations were made:—

Abstractum Pimentæ foliorum.—Prepared by the pharmacopœial process for abstracts; it is of a light-green colour, and has a strong odour of pimenta.

Extractum Pimentæ foliorum fluidum.—Experiments made with alcohol, alcohol (2 parts) and water (1 part), with and without the addition of glycerin, lead to the conclusion that diluted alcohol is the best menstruum, yielding a dark-coloured, almost black fluid extract, having a strong, pungent taste of pimenta, and fully representing the virtues of the leaves.

Extractum Pimentæ foliorum.—Using alcohol as the menstruum, 7.5 per cent. of a dark-coloured oily extract was obtained; and with diluted alcohol, 12.5 per cent. The latter was of a pilular consistence, dark brown, and had the strong odour and taste of the drug.

Tinctura Pimentæ foliorum.—Strength: 12 in 100. Menstruum used: alcohol 85, and water 15 parts. The reason for choosing a stronger alcoholic menstruum for the tincture than for the fluid extract is not stated.

Trochisci Pimentæ foliorum, containing 1 gram of the extract in 30 troches, have a fine aromatic and astringent taste.

Fabiana Imbricata, or Pichi. Dr. A. B. Lyons. (*Amer. Journ. Pharm.*, 1886, 65.) In the December issue of the *Therapeutic Gazette* there appeared an article by Dr. Rusby, with reference to a new drug which, under the name of "pichi" (pronounced peechee), has acquired considerable reputation in Chili in the treatment of urinary affections. Specimens of the drug have been sent to Europe and to the United States, and its virtues will no doubt be speedily put to the test of clinical experiment.

The drug is the product of a solanaceous plant — *Fabiana imbricata*, Ruiz et Pavon; sub-tribe *Fabianeæ*, Miers—a shrub or small tree growing on rocky, sterile hill-tops in Chili. As imported, it consists of the branches and leafy branchlets of the shrub, and these bear a close resemblance in general aspect to those of a cedar. The highly resinous character of the drug, and its aromatic odour and taste, recall the familiar *Arbor vitæ*, although the foliage bears a closer resemblance to that of the red cedar.

Dr. Rusby gives the following description of the shrub as he saw it growing in its habitat: "Growing upon high, dry hill-tops, where there is a somewhat sparse vegetation, its plume-like sprays, with their peculiar light, bluish green colour, present a rather pretty appearance against the sky, although the shrub is somewhat straggling; more so here than in the south, where it becomes a small tree. Seeing one of these sprays without flowers for the first time, it is hard to realize that it is not a conifer, and seems almost incredible that it belongs to the tobacco family. The minute branchlets are densely crowded, and terminated in the second year by the solitary flower. The white, nerved, withering, persistent corolla is $\frac{1}{2}$ inch long, four times the length of the bell-shaped calyx, funnel form, with fine lobes. Fruit, an oblong, ovoid, light-brown, crustaceous capsule, $2\frac{1}{2}$ lines long; seeds, about four, $\frac{1}{2}$ line long."

From Dr. Manuel S. Ramires, of Valparaiso, Dr. Rusby learned that the remedy had proved curative in a case of calculous disease. Dr. Ramires had himself made a careful study of the drug, finding it a diuretic of considerable importance, but inapplicable to cases of kidney disease in which there was degeneration of the excreting organ. He considered it a valuable remedy in catarrhal inflammations of the urinary tract, but believed that its action in restoring impaired digestive powers was even more important than its diuretic property. He had found it also

a hepatic stimulant, although this action might be secondary, and dependent upon improved digestion.

The author's analysis of this drug shows the presence of the following constituents:—

A minute quantity of some alkaloid, probably peculiar to the drug, and capable of forming crystallizable, bitter salts.

A neutral, crystallizable principle, rich in carbon, insoluble in water, tasteless, and probably inert.

A fluorescent body (perhaps more than one), closely resembling æsculin.

Volatile oil.

A bitter resin, probably complex in composition, present in great abundance, soluble in alkalies, reprecipitated by acids, not fluorescent, soluble in ether and chloroform, very sparingly in water and in petroleum ether.

It seems probable that the three last named constituents are the important ones, unless, indeed, there be a bitter in addition to the fluorescent principle, which dissolves somewhat freely in water. The tincture of the drug has a very clinging, disagreeable bitter taste, and unless an alkali is added, it precipitates much resin when mixed with water.

The Saccharine Constituent of Senna. A. Seidel. (*Amer. Journ. Pharm.*, November, 1885, 557.) The sugar of senna leaves was isolated by Kubly in 1865, and named cathartomannit. The author has further examined this substance, for which he proposes the name "sennit." The most satisfactory process for preparing this sugar was by concentrating in vacuo the aqueous infusion of the leaves, precipitating mucilage and salts from the syrupy liquid by two volumes of strong alcohol, filtering, distilling off the alcohol, diluting the residue with water, digesting for twenty-four hours with oxide of lead, again evaporating in vacuo to a syrupy consistence, crystallizing upon flat plates over burned lime, which requires four or five weeks, and purifying by recrystallization from methyl alcohol and washing with absolute alcohol. Thus prepared, sennit has the composition $C_6H_{12}O_5$, and forms colourless microscopic hemiedric crystals of the rhombic system, mostly sphenoids with curved sides. It has a very sweet taste, melts at $183^{\circ}C$. (corrected 185.6°), and is soluble at the ordinary temperature (about $20^{\circ}C$.) in $1\frac{3}{4}$ parts of water, 450 of absolute alcohol, 48 of alcohol of 90 per cent., 82 of methyl alcohol, and about 10,500 parts of absolute ether. It is dextrogyrate, unfermentable, prevents the precipitation of copper and iron salts by alkalies, and does not reduce

Fehling's solution (also not after boiling with acid), silver nitrate, or solutions of gold or platinum. By treatment with dilute nitric acid, it yields oxalic acid, but no mucic acid. On evaporating sennit with an excess of dilute nitric acid, a snow-white mass is left which dissolves with an intense yellow or yellowish colour in ammonia, and with a yellow colour in sodium acetate; on the addition to the ammoniacal solution of a drop of barium chloride solution, a reddish brown precipitate is produced, the liquid gradually becomes rose-coloured, and on spontaneous evaporation leaves a raspberry-red residue. Similar colorations are produced by strontium chloride, but the residue is in transmitted light rose-coloured, while in reflected light it is green, and has a metallic lustre. These characteristic colour reactions are at once produced in the solution in sodium acetate mentioned above. Inosit, quercit, and probably pinit, give a similar reaction; but not mannit, dulcit, glucose, or saccharose. Compounds with calcium, barium, and lead were prepared; also an acetyl compound, showing sennit to be a pentatomic alcohol.

New Alkaloids of Jaborandi. E. Merck. (*Pharm. Zeitung*, July 15, 1885; *Pharm. Journ.*, 3rd series, xvi. 106.) The two alkaloids hitherto known to exist in jaborandi are pilocarpine and jaborine. The author now announces the discovery of two other bases, which have been named pilocarpidine and jaboridine, the former behaving like pilocarpine and the latter like jaborine. Free jaboridine is syrupy, but its nitrate forms beautiful prisms. Pilocarpidine corresponds chemically in most respects with pilocarpine, but differs in the aqueous solutions of its salts not being precipitated by gold chloride. Jaborine and jaboridine do not exist in the plant already formed, but are derived easily from pilocarpine and pilocarpidine respectively by oxidation. The formula attributed to pilocarpidine is $C_{10}H_{14}N_2O_2$, that to jaboridine, $C_{10}H_{12}N_2O_3$; the change would therefore appear to consist in the substitution of two atoms of hydrogen by one of oxygen. Harnack, who has closely examined this group of alkaloids, is of opinion that the compound hitherto designated as "jaborine" has been a mixture of jaboridine with jaborine, the formula of which has not yet been worked out. The formula of pilocarpine ($C_{11}H_{16}N_2O_2$) is consistent with that base being a methyl substitution product of pilocarpidine ($C_{10}H_{14}N_2O_2$), whilst the formula of pilocarpidine differs from that of nicotine ($C_{10}H_{14}N_2$) only by O_2 , and it is thought therefore that pilocarpidine may prove to be dihydroxyl-nicotine.

Constituents of the Leaves of the Cowberry (*Vaccinium Vitis-Idæa*.) E. Claassen. (*Chemical News*, lii. 78.) The bitter principle of the cowberry is shown to be identical with arbutin. The author points out that as arbutin is decomposed by boiling with most acids, even when they are much diluted, all acid should be neutralized before boiling when preparing it from bearberries, otherwise some of the glucoside will be lost.

Barosma Crenata. P. Spica. (*Gazzetta Chim. Ital.*, xv. 195-202.) The therapeutic value of extract of leaves of the *Barosma crenata*, or buchu, in chronic diseases of the genito-urinary organs and in catarrh, seems to depend on the presence of an ethereal oil and an exceedingly bitter resin. Flückiger (*Pharm. Journ.*, 1880, 219), in an investigation of the allied species, *Barosma betulina*, obtained a crystalline substance and an oil. On extracting the leaves with ether, and subsequent distillation, an oil is obtained, separable by potash into a soluble and an insoluble portion (eleoptene). Hydrochloric acid precipitates from the former a crystalline substance, best separated by solution in ether.

The *eleoptene* is a colourless oil boiling at 204-206°, resembling peppermint in odour; the results of analyses seemed to indicate that this compound is an isomeride of borneol, $C_{10}H_{18}O$; on distillation with sodium, it is converted into a phenolic substance, $C_8H_{12}O$; this is a slightly yellowish oil, sparingly soluble in water, and resembling thymol in taste and colour.

The crystalline substance (*stearoptene*) mentioned above, forms long colourless monoclinic needles, partially subliming at 82°, and boiling at 220° with decomposition. Analyses pointed to a formula, C_5H_8O , probably $C_{10}H_{16}O_2$, or an oxycamphor ($C_{14}H_{22}O_3$, Flückiger.) It appears probable that this substance is a phenylic ether containing a phenolic hydroxyl grouping.

Constituents of the Leaves of the Virginia Creeper (*Cissus Quinquifolia*.) T. L. Phipson. (*Chemical News*, lii. 65, 66.) The extract obtained by soaking the leaves of this plant in water is strongly acid, and citric, caffetannic, and small quantities of tartaric acid have been detected in it. If the extract is saturated with sodium carbonate, and evaporated to a syrup, sodium viridate is formed. When the extracted leaves are treated with dilute soda, a large proportion of quercitrin is dissolved before any chlorophyll is taken up.

Constituents of the Leaves of Ilex Cassine. F. P. Venable. (*Chemical News*, lii. 172.) This shrub, the yopon, belongs to the same genus as the *Ilex paraguayensis*, and the decoction of its

leaves is also used as a beverage, and is very sudorific. The leaves contain the following constituents in 100 parts:—Water in air-dried sample, 13·19; extracted by water, 26·55; tannin, 7·39; caffeine, 0·27; nitrogen (on combustion), 0·73; ash, 5·75. The ash, on analysis, yielded the following results:—Ca O, 10·99; Mg O, 16·59; Na₂ O, 0·47; K₂ O, 27·02; Mn O₂, 1·73; Fe₂ O₃, 0·26; S O₃, 2·50; Cl, 0·66; P₂ O₅, 3·34; Si O₂, 1·32.

Adonis Vernalis and Adonidin. J. Mordagne. (*Pharm. Journ.*, from *Bull. de la Soc. de Pharm. du Sud-Ouest*, July, 1885.) The *Adonis vernalis*, nearly unknown in modern therapeutics until recent years, has been rescued from oblivion by the clinical and physiological experiments of Bubnoff, in 1880, and the researches of Cervello, in 1882, upon the active principle of the plant and its physiological action. As a result, the plant has been utilized as a substitute for digitalis in the treatment of affections of the heart.

Taking up the researches of M. Linderos, who had detected the presence of aconitic acid in the plant in the state of aconitate of lime and of potash, and those of Dr. Cervello, who discovered in it a new glucoside that he named “adonidin,” the author of the present paper has occupied himself principally with the latter body.

The parts of the plant operated upon were the leaves and the stalks, and the process is described as follows. The leaves and stalks, after being exposed to the air and dried in a stove at 40° C. for several days, lose one-fifth of their weight of water. They are next macerated during five days, with about five times their weight of 50° alcohol; the liquor is then decanted off, and the spirit removed by distillation. The residual liquid is now treated with subacetate of lead, which causes the formation of a rather voluminous yellowish precipitate, that carries down with it a certain quantity of colouring matter and aconitic acid as aconitate of lead. This is removed by filtration, and the filtrate treated with solution of carbonate of soda to remove excess of lead. The resulting brown solution is rendered alkaline with a few drops of ammonia solution, and then the glucoside is precipitated from it by means of a strong solution of tannin. This precipitation is not effected, or only incompletely, in an acid liquor. The tannate of adonidin so obtained is fairly abundant, yellowish grey in colour, and soluble in a large quantity of water; its bitterness is characteristic. The tannate is dried between two papers, and mixed intimately with very pure finely pulverized hydrate of zinc, or hydrate of lead, so as to form a homogeneous powder. This is suspended in 90° alcohol, which is gently heated during several

hours in an apparatus fitted with a return condenser. Or the tannate and the hydrate of zinc may be treated together with the alcohol in a capsule, until the disappearance of the liquid; but the former plan has given the author the best results, the spirit being driven off afterwards in a water-bath. The residue is then treated with absolute alcohol, and the mixture filtered. The resulting alcoholic solution of adonidin is treated with charcoal, so as to remove as much as possible of the brown colour, and then ether is added, which causes the precipitation of some foreign matters, as well as traces of adonidin. Finally, it is cautiously evaporated, and the residue, spread out in thin layers, is exposed in a vacuum together with chloride of calcium or sulphuric acid.

The preparation of the glucoside is long and delicate, in consequence of the readiness with which bodies of this class undergo decomposition. The points insisted upon by the author are: (1) preliminary and thorough treatment with subacetate of lead, which removes a great part of the colouring matter, as well as a pitchy product, probably resulting from the resinification of an essential oil observed in the leaves; (2) elimination of excess of lead by carbonate of soda; (3) precipitation of the tannate from an ammoniacal solution; (4) intimate mixture of the tannate with the oxide of zinc; and (5) the avoidance of too high a temperature in operating upon the alcoholic solution of adonidin, which would give rise to a deeper brown colour.

Chemical and Physical Characters of Adonidin.—Adonidin generally occurs in the amorphous state, but after a long desiccation the author has obtained a substance presenting a diffuse and radiating crystallization. Ammonia vapour is sufficient to put a stop to this crystallization. The adonidin, spread in a thin layer on a plate, requires to be kept under an exhausted bell glass in the presence of sulphuric acid, for at least a month, in order to obtain a product relatively dry, and it then forms a rather hygroscopic canary-yellow powder.

The taste of this glucoside is very bitter, and it is difficult to remove from the mouth the decided bitterness it provokes.

Adonidin is rather soluble in water, though it requires a short time for complete solution. Alcohol and amylic alcohol also dissolve it in the cold. On the other hand, it is insoluble in anhydrous ether, chloroform, oil of turpentine, and benzene. It retains sufficient water to necessitate desiccation at a temperature approaching 100° C., before submitting it to an elementary analysis.

The quantity of adonidin contained in the *Adonis vernalis* is small, ten kilograms scarcely yielding two grams of dry substance. The glucoside exists even in the rhizomes and rootlets of the plant, but insufficiency of material has prevented the author from determining in what proportion.

Adonidin, when heated in a current of dry air in an oil-bath, at a temperature between 80° and 85° C., until the weight was constant, lost 3.14 per cent. of its weight of water, but underwent no perceptible change in its physical properties. Between 85° and 90° it became browner in colour, and at 100° nearly black. Upon ignition it gave off a vapour with a very penetrating and persistent odour, comparable to that of cut hay.

Adonidin is a neutral body, solutions having no other action upon litmus paper than imparting to it a yellowish tint. Under the influence of ammonia, the glucoside browns somewhat intensely. A solution heated with potash is sensibly decolorized, and in the mass of the liquid may be observed the formation of yellowish resinous corpuscles, insoluble in water. Baryta gives with adonidin no appreciable precipitate, and it is impossible to recognise the evolution of any ammoniacal odour. Subacetate of lead produces a certain cloudiness in solutions of the glucoside. Tannin produces in dilute solutions an abundant precipitation of tannate. The ordinary alkaloidal reagents produce neither coloration nor precipitate. When a solution is heated with Fehling's solution, at first only a green colour results, due to the combination of the blue and yellow liquids; but if a few drops of hydrochloric acid be added, and the heating be continued, the cupropotassic liquid undergoes reduction. The product of this decomposition has not been specially studied by the author. Whatever this may be, when the adonidin is decomposed there is a precipitation of a small quantity of resinous matter, soluble in ether; whilst at the same time a very sharp and persistent odour is developed, that may be compared to cut hay.

When ignited on platinum foil, adonidin burns without leaving a trace of residue. The author failed to detect the presence of nitrogen in the pure glucoside. Twenty centigrams heated with potassium yielded no trace of cyanide.

The imperfect crystallizability of adonidin, and its readiness to undergo decomposition, have hitherto prevented the author from making a satisfactory elementary analysis upon which to base a formula; but he gives the following centesimal composition as the mean of several experiments: C = 42.623; H = 7.547; O = 49.830.

Pharmacology.—The author concludes his paper with a section on the pharmacology of the plant. As the posology is as yet incompletely worked out, this is necessarily imperfect. Taking, however, as a basis the doses of infusion administered by Bubnoff to his patients, the author gives the following formulæ for preparation:—

Infusion of Adonis Vernalis.

Dried Leaves and Stalks	. . .	2 grams.
Distilled Water	. . .	100 „

Boil the water and pour it upon the herb, and allow it to infuse for about ten minutes.

This infusion constitutes a clear chestnut-brown solution, with a yellow fluorescence. The taste is at first barely perceptible, the first sensation experienced being that of a slightly sweetened liquid; but if the contact with the palate be continued, a very disagreeable and especially persistent bitter taste becomes perceptible.

Aqueous Extract of Adonis Vernalis.

Stalks and Leaves	. . .	500 grams.
Distilled Water	. . .	4000 „

Make first an infusion with the entire quantity of the drug and three litres of boiling water, and allow the whole to stand in contact for about twelve hours; then decant and pour the fourth litre of boiling water on the drug. After two hours' infusion the two liquors are united, and evaporated in a vacuum over a water-bath.

An average of three operations yielded 145 grams of aqueous extract for 500 grams of substance employed. Respecting the dose, the author calculates that as the quantity of infusion given by Bubnoff in twenty-four hours represented 4 grams of stalks and leaves in 180 grams of water, and as the 500 grams of the stalks and leaves yielded 145 grams of aqueous extract, the quantity of this extract corresponding to Bubnoff's daily dose of infusion would be 1.10 gram. Of course, however, these proportions would require to be confirmed by clinical experience.

The extract has the ordinary appearance of extracts: it is black, but appears brown in transmitted light. There is nothing peculiar in the odour, and it is entirely soluble in water. Diluted with an equal quantity of water, it gives an olive-brown precipitate with

phosphotungstate of soda. Subacetate of lead produces a yellowish white precipitate, whilst caustic alkalies cause the colour to become brighter. When dissolved in a large quantity of liquid, it imparts to it a dirty yellow colour. It is very bitter.

Hydroalcoholic Extract of Adonis Vernalis.

Stalks and Leaves	.	.	.	.	500 grams.
Alcohol (60°)	.	.	.	.	3000 „

Macerate the finely chopped herb during two days in the alcohol, decant the liquid, distil off the spirit, and evaporate in a vacuum over a water-bath to a syrupy consistence. At this point some tarry and resinous products, which are insoluble in water, may be seen floating on the surface. The author has obtained good results by taking up the extract again with distilled water, filtering, and evaporating afresh to a homogeneous mass.

The characters of this extract differ from those of the aqueous extract. It is soluble in water, and has a bitter taste and an empyreumatic odour. The aqueous solution gives with subacetate of lead an abundant precipitate, which according to Linderos would contain aconitine of lead. Phosphotungstate of soda produces a persistent turbidity, whilst the caustic alkalies brighten up the brown colour, and give it a tendency towards green. The yield of this extract is practically the same as in the case of the aqueous extract; on an average at least 250 grams may be expected from a kilogram of the plant.

Comparative Quality of Belladonna Leaves. V. Coblentz. (*Amer. Druggist*, July, 1885.) The samples of leaves examined by the author were such as are usually supplied to the American trade, including those in pressed packages, with the loose German and Allen's English. The samples of this last leaf average a larger percentage than any of the others. Several of the American pressed were musty, and consisted of a large percentage of stems, and yielded a very low amount of alkaloid; while some others of American pressed yielded a percentage of alkaloid that compared favourably in amount to the best. The German leaves varied considerably in their alkaloidal yield, probably depending on careless handling and storing, as well as collection at the wrong season. The results are summed up in the following table, giving the quantity of alkaloid (atropine and hyoscyamine) in 100 parts or grams of the dry leaf as the alkaloidal residue; the pure alkaloid is also given as found in estimation as periodides.

No.	Alkaloidal Residue.	Pure Alkaloid.
1. . . .	·0179 . . .	·0171
2. . . .	·0095 . . .	·0090
3. . . .	·0205 . . .	·0182
4. . . .	·0439 . . .	·0433
5. . . .	·0405 . . .	·0398
6. . . .	·0050 . . .	·0020
7. . . .	·0117 . . .	·0109
8. . . .	·0092 . . .	·0090

German Leaves :—

1. . . .	·0221 . . .	·0212
2. . . .	·0432 . . .	·0420
3. . . .	·0185 . . .	·0180
4. . . .	·0127 . . .	·0109

English Leaves :—

1. . . .	·0426 . . .	·0422
2. . . .	·0417 . . .	·0411

Parthenium Hysterophorus. M. Guyet. (*Gaz. Méd.* May 29, 1886, 259.) The author finds that the alkaloid "parthenine," alleged to be the active principle of this plant, is not a definite body but a complex substance, comparable to scillitine, or the amorphous digitalines.

Cirsium Arvense. E. B. Shuttleworth. (*Canadian Pharm. Journ.*, September, 1885.) The author has made an analysis of the flower-heads of the Canadian "thistle" (*Cirsium arvense*), which he finds to contain an acid resin and small quantities of an essential oil. He also obtained indications of the presence of an alkaloid, which he proposes to name "cirsine."

Estimation of Santonin in Santonica. F. A. Flückiger and J. Ehlinger. (*Archiv der Pharm.* [3], xxiv. 1-11.) To determine the amount of santonin in the plants in which it occurs, the following method was finally adopted:—5 parts of raw material mixed with 1 part of slaked lime were boiled for a couple of hours with a considerable amount of alcohol of sp. gr. 0·0935. After allowing to cool, the liquid was poured off, and the boiling was repeated twice at least with fresh alcohol, after which the whole of the alcohol was distilled off from the clear solution. The residual liquid was saturated in the cold with carbonic anhydride, filtered after some hours, and the filtrate evaporated to dryness. The residue was then ground up with animal charcoal and alcohol of the strength given above, and digested with a measured quantity of alcohol. After boiling up, the liquid was passed

through a filter, the residue was washed with hot alcohol, and the alcohol expelled from the filtrate, yielding a liquid in which santonin crystals appeared after some hours. One sample of *Flores cinæ* thus treated gave 1·82, 1·88, and 1·92 per cent. of santonin; further, 20 grams of an exhausted sample of worm-seed, to which 0·30 gram of santonin was added, yielded 0·29 gram of santonin. Santonin occurs only in the parts of the plant above ground, not in the dry, woody root.

Mahwa Flowers. A. H. Church. (*Nature*, xxxiii. 343, 344.) It having recently been stated that "mahwa flowers" (the corollas of *Bassia latifolia*, a tree common in many parts of India, especially in Central Hindustan) form a cheap source of cane-sugar, a sample of these flowers from the Kew Museum, in their air-dried condition, was analysed, with the following results:—

Cane-Sugar	3·2
Invert Sugar	52·6
Other Matters soluble in water	7·2
Cellulose	2·4
Albuminoids	2·2
Ash	4·8
Water at 100°	15·0
Undetermined	12·6

It is not at all probable that these flowers could have contained any large amount of cane-sugar when in the fresh condition.

Constituents of Hops. H. Bungener. (*Bull. de la Soc. Chim.*, May 5, 1886.) The author rejects the view that the resin of the hop-cones is the bitter principle. This resin is insoluble in water, but a decoction of hops made with distilled water is quite as bitter as a decoction of malt in which an equal quantity of hops has been boiled. The author shows that the crystalline acid, first obtained in an impure state by Lerner, is really the bitter principle. This lupulic acid is insoluble in water, but its oxidation-product dissolves rapidly in water with the aid of heat, imparting to it an intensely bitter taste.

Asparagin in Hops. H. Bungener and Fries. (*Chemiker Zeitung*, 1885, No. 86.) The authors have shown that hops contain about 1 per cent. of asparagin, the nitrogen of which is equal to 30 per cent. of the total nitrogen in hops.

Arum Italicum. G. Spica and G. Biscaro. (*Gazzetta Chim. Ital.*, xv. 238-242.) As the symptoms occurring in three cases of poisoning by eating the spadices of the *Arum italicum* were peculiar, the authors have made a chemical and a physiological

study of this species. From the spadices a glucoside has been extracted, identical with saponin; the symptoms produced by the hypodermic injection of both substances into frogs were compared, and found to be practically the same. In both cases, general paralysis of the nervous and muscular systems supervened, ending, in most cases, in death. The symptoms are not those of tetanus, as at first supposed.

Adulterations of Saffron. J. M. Maisch. (*Analyst*, x. 200-203.) Styles, stamens, and corolla tubes of the saffron flower, meat fibres, petals of pomegranate and of saponaria, and florets of composite flowers, are amongst the most common organic adulterants of saffron; whilst chalk, gypsum, and barium sulphate are found as mineral adulterants. These adulterants have frequently to be dyed, for which purpose red saunders or Brazil wood is used. Descriptions of the various organic adulterants are given in the paper. Microscopic examinations, soaking in water and subsequent ocular inspection, coupled with chemical tests with acids, alkalies, testing for tannin, etc., are recommended for the analytical examination of saffron.

Hopea Splendida. (*Amer. Drugg.*, 1885, 160.) The seeds of *Hopea splendida*, *H. aspera*, and some other species, are said to furnish a fatty matter, known in the Sunda Islands as *myniak tangkawank* or *myniak sangkawank*, which is used for various purposes, and seems likely to be of value pharmaceutically.

Tanghinia Venenifera. M. C. E. Quinquand. (*Comptes Rendus*, ci. 534.) The author has investigated the physiological properties of the ordeal bean of Madagascar (*Tanghinia venenifera*). The principal feature consists in an increase of medullary reflectivity in animals; the respiration is at first accelerated, then slowed, and the animal dies from arrest of respiration, the heart continuing to beat. The poison has been administered to human beings for different diseases, and appears likely to be useful in toxic paralysis, trembling (palsy), and want of tone in the intestines; and in two cases of nocturnal incontinence of urine it has proved of service. The symptoms for discontinuing its use are the appearance of headache and nausea, vomiting, and a certain degree of feebleness.

Gymnocladus Canadensis. Prof. R. Bartholow. (*Amer. Journ. of Med. Sc.*, April, 1886.) The author reports the preliminary results of experiments with the *Gymnocladus canadensis*, or Kentucky coffee-bean, a concentrated aqueous extract having been employed. The toxic properties of the drug have already been observed, flies having been stupefied by it, and the author's

experiments show that the drug has powers analogous to those of Calabar bean.

Guarana. MM. Bochefontaine and Gusset. (*Chemisch Technischer Central Anzeiger*, iv. 322.) The authors give the directions for the extraction of guaranine:—5 grams of powdered guarana are mixed with 1 gram of calcined magnesia, and the whole moistened with water; after twenty-four hours the mass is exhausted with 40 grams of boiling chloroform, the chloroform distilled or evaporated, and the residue treated with boiling water, filtered, and evaporated over sulphuric acid. After several recrystallizations, colourless crystals of guaranine are obtained. Yield = 4·5 per cent.

Eriobotrya Japonica. (*Pharmaceut. Rundschau*, 1886; *Amer. Journ. of Pharm.*, 1886, 250.) *Eriobotrya japonica*, the loquat tree, or Japanese medlar, has been perfectly naturalized in Brazil, where it grows quite luxuriantly. The yellow, pear-shaped fruit is of about the size of a plum, covered with a silky pubescence, contains two to five blackish brown glossy seeds, and has a vinous odour and an agreeable, sweetish, acidulous taste; by fermentation the fruit yields a vinous beverage. The bruised seeds, treated in the same manner as bitter almonds, yield a distilled water containing 0·05 per cent. of hydrocyanic acid, and in appearance and odour closely resembling cherry-laurel water, but having a peculiar bitter taste. The leaves of the loquat tree have been found of service in chronic diarrhœa.

Peganum Harmala. O. Fischer and E. Tacuber. (*Amer. Journ. Pharm.*, 1886, 89.) The alkaloid *harmaline*, $C_{13}H_{14}N_2O$, was isolated from the seeds by Goebel in 1837, and subsequently (1847) investigated by Fritzsche, who also discovered a second alkaloid, *harmine*, $C_{13}H_{12}N_2O$. With the view of ascertaining their chemical constitution, the two alkaloids have been further studied by the authors. *Harmaline* crystallizes from wood spirit in yellowish scales, melting with decomposition at $238^{\circ}C.$, yielding coloured, strongly fluorescent salts, and on being warmed with strong sulphuric acid giving a solution of *harmalin-sulphonic acid*, which after dilution with water exhibits a beautiful sky-blue fluorescence. Treated with fuming hydrochloric acid under pressure, crystalline *harmalol* is obtained, which is orange-red or brick-red, somewhat soluble in water, and in this solution shows a magnificent green fluorescence; it is probably identical with the yellow colouring matter contained in the seeds. By the oxidation of *harmaline* with nitric acid, *harmine* is formed, but the latter

could not be converted into the former by reducing agents. Harmine crystallizes in colourless needles, melts with partial decomposition at 256° C., and is partly sublimable; its colourless salts show in diluted solution indigo-blue fluorescence. Treatment with fuming hydrochloric acid converts it into a phenol, *harmol*, which in acid solution has a violet fluorescence. By oxidation with chromic acid, *harminic acid*, $C_{10}H_8N_2O_4$, is obtained in silky needles.

Semen Cedronis. C. Hartwich. (*Archiv der Pharm.*, cciii. 249; From *Pharm. Journ.*) Several genera of the family *Simarubæ* are distinguished by the large quantity they contain of intensely bitter substances, which, so far as is known, may be all identical with or nearly allied to the more exactly investigated quassiin. It is to the presence of these substances that is due almost exclusively the medicinal use of different parts of these plants, especially in former days, and which is still tolerably widespread in the present time. For instance, the wood from *Picræna excelsa*, Lindl., and *Quassia amara*, L., are used, and the root bark of *Simaruba officinalis*, D.C., and *S. medicinalis*, Endl. According to Fremi, the flowers also of the *Quassia amara* are in favour with the natives as a remedy against disorders of the stomach. Further, Flückiger has referred to the large proportion of quassiin contained in the seeds of *Samadera indica*, Gaertn., without, however, mentioning any medicinal use of them. In Brazil the freshly pressed juice of *Simaruba versicolor*, S. Hil., is used as a remedy against skin parasites. Further, in the same country the fruit of *Simaba Waldivia* enjoys a great reputation on account of its healing action.

To this latter genus belongs also the *Simaba Cedron*, Planch., yielding the seeds that are the subject of the present note, which have long been known and formerly enjoyed an unmerited reputation, but afterwards fell almost into oblivion. These seeds have again recently frequently appeared in commerce as a remedy in stomachic disorder. Their reputation in former times was due to the beneficial action attributed to them in fevers and snake-bites. In the latter respect it is even now believed in Costa Rica that they not only have a healing effect when taken by a bitten person, but it is said the exhalation from people who for a time drink a liqueur prepared from the seed or the bark, acquires such an odour that poisonous snakes, insects, and spiders, are scared by it. But it is now recognised that an antidotal action against snake-bite does not exist in the seeds, whilst their antifebrile

properties appear also very problematic. Du Coignard observed that the Indians of New Granada used 95 grams of the seed with effect during the cold shiverings, and he himself obtained results with them where quinine had failed, but he confesses that the activity of the seeds was not uniform. Other observers could recognise no action at all. Whether, as has recently been affirmed, the drug is a remedy against insanity, is probably also open to doubt.

The plant occurs in New Granada, especially along the Magdalena river. Polakowsky brought the seeds from Costa Rica, where the plant, according to his statement, grows in the hot lowlands of the coast district on the western side of the republic. He mentions also the statements of Scherzer and Wagner, that it is frequent in the woods on the eastern side. It appears, however, to extend considerably farther north, since seeds were exhibited in Berlin, in 1883, from Mexico.

The seeds have long been known; according to Lindley they were mentioned as far back as 1699. The tree was discovered in 1846, by Purdie, and described by Planchon. It attains a height of 6 metres, and the stem a diameter of 15 to 25 centimetres. The pinnate leaves are smooth, at least 60 centimetres long, consisting of at least twenty leaflets, and are alternate or opposite; the leaflets are sessile, 10 to 15 centimetres long, acuminate and penninerved. The common petiole is cylindrical, and terminated by an odd leaflet. The racemes are 60 centimetres long or more, densely crowded, strongly branched, covered with a short velvety reddish down. The calyx is small, cup-shaped, with 5 obtuse teeth, and an ochreous down. The corolla has six [according to Planchon five] spreading, pale-brown petals, downy externally. Ten short stamens stand behind a similar number of scales, which approximate to form a tube. Carpels five; styles five, above the base, and longer than the stamens; one ovule in each carpel. The fruit is very large, one-seeded by reason of the abortion of the other carpels, berry like, ovate, oblique at the top; the fleshy part of the fruit, which does not appear to be very soft, is inclosed in a horny endocarp. Seeds very large, suspended, covered with a membranous integument, with a very distinct chalaza; no endosperm; cotyledons very large, in the fresh condition fleshy and white.

Only the cotyledons are met with in commerce. They are 3 to 4 centimetres long, 1.5 to 2.5 centimetres broad, longish ovate, rounded on one side; on the other side, straight or even somewhat

reniform indented, ridged on the outer surface, smooth on the inner. At one end the cotyledons are notched in a peculiar manner, a fissure that begins nearly at the top of the ridged side running right and left for about $1\frac{1}{2}$ centimetre, and separating two semicircular pieces of about 2 millimetres in diameter. To this notch corresponds a point on the inner flat side of the cotyledon, which, according to Vogl, is the residue of the radicle. In a transverse section are seen upon the convex side five or six faint vascular bundles; the remainder of the tissue consists of uniform polyhedric cells, which appear to be pressed together and elongated tangentially. The contents consist of tolerably large roundish oval starch granules. In addition, albumen can be detected, especially in a layer lying next the cell wall, and traces of fat.

Constituents of the Rind of the Bitter Orange. C. Tanret. (*Comptes Rendus*, cii. 518-520; from *Journ. Chem. Soc.*, 1886, 576.) The rinds were extracted with alcohol of 60° , the solution distilled, and the residue agitated with chloroform. The chloroform was then distilled off, and the residue treated with cold alcohol, which precipitates one constituent, *a*, and dissolves another, *b*. The liquid separated from the first chloroform solution deposits crystals of a third constituent, *c*, and two other substances, *d* and *e*, can be isolated from the mother-liquor.

The substance *a* exists in the rind to the extent of 0.05 per cent., and has the composition $C_{22}H_{28}O_7$. It forms slender, white, tasteless non-volatile crystals, insoluble in water and in ether, only slightly soluble in cold alcohol, but soluble in 100 parts of boiling alcohol and in 60 parts of chloroform. It does not combine with ammonia, but with the other alkalies it forms soluble non-crystallizable salts, which are decomposed by carbonic anhydride.

The substance *b* is present to the extent of about 0.1 per cent., does not crystallize, and has an extremely bitter taste. It is almost insoluble in cold water, but dissolves readily in boiling water, and is also soluble in ether, and in all proportions in alcohol and chloroform. It dissolves in sulphuric acid diluted with its own volume of water, with formation of a yellow solution, but it does not yield glucose when heated with acids. It has a laevorotatory power $[\alpha]_D = -28$, and its composition is almost identical with that of hesperetic acid.

The substance *c* varies in amount from 0.4 to 3.0 per cent. It crystallizes in microscopic needles with a bitter taste, has the same composition as hesperidin, $C_{22}H_{26}O_{12}$, and resembles it in its comparative insolubility in water, but it differs from hesperidin in

being much more soluble in boiling water, in alcohol, and in ethyl acetate. The author distinguishes it by the name *isohesperidin*.

The mother-liquor from the isohesperidin contains *aurantiamarin* (C, 53.04-53.48; H, 6.36-6.16), to which the bitter taste of the rind is due, its amount varying from 0.15 to 0.25 per cent. It dissolves in all proportions in water and alcohol, but is insoluble in ether and chloroform. It resembles hesperidin and isohesperidin in its properties and composition, and has a levorotatory power $[\alpha]_D = -60^\circ$. The other product from the mother-liquor is hesperidin (0.0 to 0.6 per cent.), which crystallizes from boiling alcohol in white silky needles.

Maize and Oil of Maize. J. M. Maisch. (*Amer. Journ. Pharm.*, 1885, 403.) Maize or Indian corn is a valuable article of food, containing about 10 per cent. of nitrogenous principles and 7 per cent., or in some varieties 9.5 per cent., of fat. The presence of the latter interferes with many of the uses for which corn is otherwise adapted, but the ripe fruit cannot be deprived of the oil by pressure. After the grain has been malted, the light germ may be separated by careful crushing and winnowing, and yields by pressure about 15 per cent. of oil, and a press cake, rich in albuminoids and retaining 4 or 5 per cent. of oil. In the manufacture of starch, the mixture of ground corn and water, on standing, deposits the starch and leaves a milky liquid, which readily undergoes putrefaction. This liquid is an emulsion of oil of maize in the dissolved albuminoids, and may be utilized for the production of both substances. The separation may be accomplished according to a patent granted March 10, 1885, to Dr. F. V. Greene, by precipitation, by heat, or by diluted mineral acids or various salts, notably by aluminium sulphate. According to the manipulation, the oil may be recovered by filtration, by pressure, or by a solvent, the remaining albuminoids being valuable for manure or for other purposes.

Oil of maize has been used to some extent as a lubricator and for soap-making. It is of a yellowish or bright yellow colour, bland, rather thick, has the specific gravity 0.92, and at -10°C . (14°F .) congeals to a white mass. The oil is coloured transiently dark green by sulphuric acid, and orange red by nitric acid, and by nitrous acid it is converted into a somewhat soft yellow mass.

Note on the Species of *Strophantus* used in Medicine. E. M. Holmes. (*Pharm. Journ.*, 3rd series, xvi. 778.) In Professor Fraser's paper on the Kombé arrow poison (*Strophantus hispidus*, D.C.) of Africa, published in the *Journal of Anatomy and Physi-*

ology, vol. vii., a note is appended on page 142 to the effect that Professor Oliver had been led by a further examination of the botanical characters of the Kombé poison plant to doubt its identity with *S. hispidus*, and had accordingly described it in the *Icones Plantarum*, November 4, 1870, under the name of *S. Kombé*. But the specimens at Kew were not accompanied with fruits. Some of the *Strophantus* seeds subsequently supplied to Professor Fraser, and derived like the first from the Shiri Valley, in the neighbourhood of Lake Nyassa, were sown in the Royal Botanic Gardens, Edinburgh, and a specimen derived from one of these plants was presented by Mr. Lindsay, the curator of the gardens. This differs both in shape and consistence of the leaf from the type specimen of *S. Kombé* at Kew, nor does it agree with *Strophantus hispidus*. It, therefore, appears probable that the seeds are derived from more than one species. In an undoubted specimen of the pods of *S. hispidus*, collected in Dr. Baikie's Niger expedition, and presented to the late Mr. D. Hanbury by Mr. Barter, the naked portion of the awn above the seed is only about one inch in length, and the hairs on the seed appear of a brown colour. In another specimen, believed to have been collected in the neighbourhood of Lake Nyassa, and presented by Messrs. Burroughs and Wellcombe, one of the follicles is striated and the other smooth; but this smoothness, as Mr. Wellcombe suggests, is probably due to the surface being scraped. The seeds appear identical in both follicles, and differ from those of *S. hispidus* in being rather larger, with hairs of a paler colour, and in the naked portion of the awn of the seed being nearly two inches in length. A third specimen, presented by the Rev. H. Waller, appears to be identical with the last. A fourth specimen, presented by Mr. H. B. Moir, consists of a much shorter follicle, with seeds having pale hairs, but with the naked portion of the awn only an inch in length. There are therefore two forms of pods and seeds, distinct from those of *S. hispidus*, coming from the district between Zanzibar and the neighbourhood of the Lake Nyassa. Which of these, if either, may be derived from the plant described as *S. Kombé*, the author thinks it impossible to say until complete specimens, consisting of leafy stem, flowers, and fruit of the same plant, are obtained.

Myristica Surinamensis. C. L. Reimer and W. Will. (*Ber. der deutsch. chem. Ges.*, 1885. 2011.) The authors describe the seed as being of the size and shape of a cherry, and invested with a dark-grey ribbed and very fragile shell, inclosing a light brown

hard kernel, which is internally marbled white and brown; odour faint, aromatic; taste peculiar, somewhat resembling that of cocoanut oil. The shells weigh about 16 per cent., and the kernels yield with hot ether 73 per cent. of fat, which is light brown-yellow, hard, crystalline, melts at 45°C ., possesses a slight not disagreeable odour, and is readily soluble in ether, benzol, and chloroform, but only partially so in petroleum benzin, and hot alcohol; the latter solvents leaving 6.6 per cent. of a yellowish, translucent caoutchouc-like substance. The fat now contains about 6.5 per cent. of free acid. It gives, with strong sulphuric acid, a fuchsin-coloured solution, which gradually becomes colourless with the separation of brown flocks. The pure fat consists almost entirely of myristin and the free acid of myristic acid.

Myristica Bicuhyba. H. Noerdlinger. (*Ber. der deutsch. chem. Ges.*, 1885, 2617.) The seeds have a black fragile testa with broad furrows, and a kernel resembling nutmegs in form, structure and size, and having an agreeable cacao-like odour, and a taste resembling that of butter of cacao, somewhat suet-like, and with a bitter after-taste. The kernel is readily scratched with the finger-nail, and by trituration in a mortar is easily converted into a soft mass. The author determined the seeds to contain water, 6 per cent., and fat, 59.6 per cent.; the shells constitute 15.5 per cent. of the weight, and contain 11.2 per cent. of water and 2 of fat; while the dried kernels contain 73.7 of fat. The crushed seeds subjected to hydraulic pressure yielded 47.56 per cent. of fat, and the press cake contained 8.86 of water, 4.50 of ash, 17.74 of fat, 30.62 of tissue, 17.62 of protein, and 20.66 of non-nitrogenous extractive. The fat extracted by ether is light yellow, and its ethereal solution yields shining white, scaly crystals and a yellow, oily mother-liquor. The expressed fat is yellowish brown, and the surface becomes covered with a white crystalline efflorescence; fused, it is dark-brown, and congeals with a wavy surface. The fat melts at 42.5 – 43°C ., and congeals at 32 – 32.5°C . It is readily soluble in hot ether, petroleum benzin, carbon bisulphide, and chloroform, and partly soluble in hot alcohol. The fat remaining in the press cake has a slightly higher melting and congealing point. The brown fat of the shells melts at 43 – 44°C . All these fats give, with concentrated sulphuric acid, a beautiful fuchsin-red colour. The shells contain, also, a wax-like body, melting at 74 – 75°C ., and very sparingly soluble in hot ether.

Analysis showed the fat to consist of the glycerides of myristic

and oleic acids, the former predominating; together with small quantities of resins, free myristic acid, little volatile oil (the stearopten is not identical with myristic acid), about 0.1 per cent. of non-saponifiable oil, and a brown colouring matter.

The Fat of the Fruit of *Myristica Surinamensis*. C. L. Reimer and W. Will. (*Ber. der deutsch. chem. Ges.*, xviii. 2011–2017.) The fruits of this plant have recently been imported into Germany under the name of oil nuts. The fruit is about the size of a cherry, the shell is dark-grey, ribbed, and very easily broken. The kernel is brown and hard, and shows a white and brown marbled surface when cut across. The powdered kernels yield 73 per cent. of their weight to boiling ether. The crude fat left on evaporation of the ether forms a hard brittle mass of yellowish brown colour and crystalline structure, and melts at 45° . The main constituent of this fat is trimyristin; free myristic acid also occurs in small quantity, together with various amorphous substances which were not further investigated.

Trimyristin (like tripalmitin and tristearin) appears to occur in two modifications having different melting points. If it is heated to 55° it melts, and when allowed to cool forms a crystalline mass still showing the same melting point. If, however, the fused mass is heated to from 57 – 58° and then allowed to cool, it solidifies to a transparent porcelain-like mass which melts at 49° . When this last modification is heated to 50° for half a minute, it becomes again solid and crystalline, and now shows the melting point 55° .

Ethyl myristate boils at 295° . When myristamide is heated with brominated potash, it is converted into the mixed carbamide, $C_{13}H_{27} \cdot NH \cdot CO \cdot NH \cdot C_{14}H_{27}O$. This crystallizes well, melts at 103° , is insoluble in water, nearly insoluble in cold alcohol, soluble in ether, and when fused with potash gives a good yield of the amine of the next lower series.

Amomum Melegueta. F. Schwartz. (*Amer. Journ. of Pharm.*, 1886, 118.) The seeds, known as melegueta pepper, or grains of Paradise, were examined by the author, with the following results:—

The powder thoroughly dried by heat lost 18 per cent. of moisture and volatile oil, and on incineration gave 9 per cent. of grey ash. Treatment with cold water furnished a light brown infusion, containing albumen, gummy matter, and a little tannin. Benzine now exhausted 5 per cent. of a reddish brown oily matter, having a slight aromatic odour and a burning taste, and soluble

in carbon bisulphide and in ether; on redissolving it in benzin, the addition of alcohol precipitated a white fat. The powder now yielded to alcohol a reddish-brown acrid resin, which is soluble in ether, but insoluble in carbon bisulphide. Neither bisulphide of carbon nor ether took up any compound from the powder exhausted as above; but treatment with boiling water furnished an amylaceous jelly.

Constituents of Fenugreek Seeds. E. Jahns. (*Ber. der deutsch. chem. Ges.*, xviii. 2518-2523.) The seeds of *Trigonella fenum-græcum* contain trigonelline, and a liquid base identified as choline. *Trigonelline*, $C_7H_7NO_2 + H_2O$, crystallizes in colourless, flat prisms, of feeble saline taste; it is readily soluble in water, sparingly soluble in cold alcohol, insoluble in ether, chloroform, and benzene; it is carbonized when heated. The reactions with the various reagents for alkaloids are described. The hydrochloride, $C_7H_7NO_2 \cdot HCl$, crystallizes in anhydrous tables; the platinochloride, $(C_7H_7NO_2)_2 \cdot H_2PtCl_6$, crystallizes in prisms. Two aurochlorides were obtained, $C_7H_7NO_2 \cdot HAuCl_4$, crystallizing in four-sided plates or flat prisms, and melting at 198° , and $4C_7H_7NO_2 \cdot 3HAuCl_4$, crystallizing in slender needles, and melting at 186° .

Rubus Chamæmorus. Dr. S. A. Popoff. (From the *Lancet*.) *Rubus chamæmorus*, the so-called cloud-berry, has a great reputation as a household diuretic in Russia. The common method of employing the berries is to steep or boil them in water, or more rarely to make a tincture with vodka, the common spirit of the country; both the berry and the calyx are employed in these preparations. The author made several attempts to obtain an alkaloid, but satisfied himself that there was no alkaloid, either in the berry or the calyx. He succeeded, however, in separating an acid as an almost colourless, flocculent powder, slightly soluble in water, easily so in spirit. The addition of an alkali produced a crystalline salt, easily soluble in water. A simple process for its preparation is said to be to infuse a large quantity of freshly gathered berries in hot spirit, acidulate with hydrochloric acid, filter, and pass through animal charcoal; on cooling and diluting with distilled water, the acid is precipitated in light flakes. The acid was found by experiments on animals to possess diuretic properties of the same character as those evinced by the other preparations of the berries, and the author therefore looks upon it as their active principle.

Composition of Sinapis Alba during Various Stages of Growth. R. Hornberger. (*Landw. Versuchs-Stat.*, 1885, 415-417.) This

valuable paper consists for the most part of tables, showing the composition of all parts of *Sinapis alba* during growth, the examination being made every seventh day from May 19 to August 18, 1885.

Examination of Commercial Specimens of Crushed Linseed and Linseed Meal. W. Lawson. (*Pharm. Journ.*, 3rd series, xvi. 245.) The following are the figures obtained in the analysis of the crushed linseeds :—

	Moisture.	Oil.	Albuminous Compounds.	Gum, Sugar.	Fibre.	Ash.
1	8.09	33.52	21.12	23.74	8.50	5.03
2	8.07	31.21	21.62	28.10	6.76	4.24
3	8.02	34.12	19.56	27.98	6.11	4.21
4	8.24	30.28	17.50	29.86	8.40	5.72
5	7.28	34.04	16.75	31.04	7.09	3.80
6	7.19	35.20	22.62	25.23	5.40	4.36
7	6.08	36.52	22.12	20.44	7.08	7.76
8	7.14	35.52	24.68	21.57	7.09	4.00
9	8.12	32.21	20.52	27.53	4.88	6.74
10	9.30	28.17	19.56	32.72	6.12	4.13
11	10.27	28.75	19.56	25.39	10.00	6.03
12	10.21	27.64	21.12	27.85	6.58	6.60
13	8.12	38.00	18.56	23.68	5.88	5.76
14	10.83	7.92	22.62	40.13	8.50	10.00
15	7.98	28.00	25.25	29.44	5.24	4.09
16	8.07	32.00	23.81	27.00	4.21	4.91
17	10.72	26.80	20.56	30.08	5.82	6.02

The examination of specimens of linseed meal gave the following results :—

	Moisture.	Oil.	Albuminous Compounds.	Gum, Sugar, Fibre.	Ash.
1	9.76	11.52	24.16	46.06	8.50
2	9.50	7.20	16.43	58.87	8.00
3	12.00	3.76	13.37	62.11	8.76
4	10.60	10.48	28.31	45.40	5.21
5	11.61	2.00	20.56	58.19	7.64
6	10.80	8.24	20.06	52.90	8.00
7	10.76	13.92	20.56	49.02	5.74
8	9.86	7.10	25.25	46.29	11.50
9	10.32	8.48	22.52	50.96	7.72

Adulteration of Linseed. M. Renouard. (*Chemist and Druggist*, December, 1886, 728, from *Répert. de Pharm.*) The author says that all linseed shipped from Riga contains some grains, in

the form of elongated seeds, from which a bunch of hair escapes. This is so common as to be regarded as an indication of *Rigalinsed*. He has traced this seed to the *Centaurea cyaneus*, or common corn blue-bottle. Its presence is due to inefficient weeding.

The Therapeutic Value of *Sedum acre*. Dr. P. O. Wagener. (*Therap. Gaz.*, July, 1885, 449; *Pharm. Journ.*, 3rd series, xvi. 107.) Some time since a decoction of *Sedum acre* was recommended by Dr. Duval as useful in the treatment of membranous croup and diphtheria. The value of the drug is confirmed by the author, who, however, seems to think that the administration of a decoction is based on a misapprehension, and moreover is apt to induce gastritis. He says that the value of *Sedum acre* in diphtheria does not depend upon any specific property for the cure of the disease, but upon its power of loosening the false membrane; consequently it is useless in the first stage of the disease, and should only be employed as a local application when the false membrane has been developed. The author says that he has been in the habit of prescribing a liquid extract of *Sedum acre*, in combination with spirit of turpentine, lactic acid, and liquid extract of aconite. An application of this mixture to the throat is ordered to be made with a brush every three minutes for twenty minutes, and if by this time vomiting has not commenced, emesis is provoked, during which the membrane is said to be expelled, and has not been noticed to be redeveloped.

Constituents of *Hyacinthus Orientalis*. A. Tschirch. (*Bied. Centr.*, 1885, 551.) A fully-grown sample of *Hyacinthus orientalis* was found to contain:—

Water	.	.	.	.	.	.	89·89 per cent.
Dry Matter	.	.	.	.	.	.	10·11 „
Nitrogenous Constituents	.	.	.	.	.	.	2·063 „
Ash	.	.	.	.	.	.	8·5787 „

Of the constituents of the ash, 46·97 per cent. consists of K_2O , 16·94 of Cl , and 6·59 of Na_2O , whilst MgO is present to the extent of 7·219, insoluble in water; the ratio of insoluble to soluble ash is 1:4·76. Comparing this ash with that of *H. non-scriptus*, more soda is present in the last, namely, 16·41, together with CaO , 10·35, and Cl , 19·99.

Euphorbia Heterodoxa. (*Chemist and Druggist*, 1886, 69.) The *Euphorbia heterodoxa*, a native of Brazil, possesses a resinous active principle, contained chiefly in the juice, which exerts a peculiar destructive action upon certain neoplasms. The juice of

this plant has the reputation among the natives of curing cancer. Dr. Landowski has experimented with it in chancroids, epetheliomata, syphilitic vegetations, and found it to possess a powerful escharotic effect, with a dissolving action upon organic tissues, resembling a combination of a powerful caustic with a papaine. The remedy is applied with a brush, and the tumour dressed with vaseline containing boric acid. Dr. M. de Santa Cruz has found that the resin possesses the same properties as the juice, and is permanent, while the juice quickly deteriorates.

Strophanthin, a New Diuretic. Prof. Fraser. (From *Brit. Med. Journ.*) This new diuretic is derived from *Strophanthus hispidus* (*S. Kombi*, Oliver), from which negroes in Mungua, Senegambia, and Guinea, prepare an arrow-poison called *Kombi* or *inée*. The plant is a woody climber, flowering in October or November. The follicles, 10 to 12 inches long, contain from 150 to 200 seeds, weighing each about half a grain, and bear a plume-like tuft at the extremity of a delicate stalk. The active principle is crystalline, intensely active, and allied to digitalin. The hypodermic dose is $\frac{1}{120}$ to $\frac{1}{60}$ of a grain.

Withania Somnifera. Dr. Trebut. (From *The Lancet*.) *Withania somnifera* is a solanaceous plant, very common along the shore of the Mediterranean. The author has undertaken to investigate the grounds for its local reputation for hypnotic powers, and has extracted an alkaloid whose sulphate is crystalline, and which has hypnotic action, but does not produce mydriasis. He calls the alkaloid "somniferine."

Lantana Brasiliensis. Dr. Negrete. (*Nouv. Rem.*, September, 15th, 1885, 282; *Pharm. Journ.*, 3rd series, xvi. 289.) A new alkaloid, named "lantanine," has been discovered by the author in *Lantana brasiliensis*, a plant which has been used by Dr. E. Buiza, in the Central Hospital at Lima, as an antipyretic. Dr. Buiza had been in the habit of administering the tincture, which has a very bitter taste. At his request the author analysed the plant, to ascertain whether a better pharmaceutical preparation of it could be made, and this led to the detection of the alkaloid. Lantanine, like quinine, depresses the circulation and lowers the temperature. It is tolerated by the most delicate stomach. Intermittent fevers, which have not yielded to treatment with quinine, have given way under the use of two grams of lantanine. The dose hitherto given has been one to two grams during the twenty-four hours, prescribed in the form of pills, containing ten centigrams each, given immediately after the commencement of the hot stage. In

ninety-five cases out of one hundred the return of the hot stage was prevented.

Vaccinium Macrocarpon. E. Claassen. (*Amer. Journ. Pharm.*, 1886, 321-325.) The author shows that the American Cranberry (*Vaccinium macrocarpon*) contains in all parts a very bitter, uncrystallizable principle, for which he proposes the name "oxycoccin." It represents a yellowish brown extract-like mass, which gives, when dried, a very hygroscopic powder of a lighter brown colour.

It dissolves easily in water and alcohol, very sparingly in ether and chloroform. When heated on platinum foil, it at first swells up considerably, evolving a strong, peculiar smell, then ignites with flame, and is almost entirely consumed, leaving but little ashes (of an alkaline reaction), containing sodium and some potassium. Heated in a glass tube, it is easily reduced to coal under evolution of a penetrating smell, somewhat resembling that of tobacco juice. In its conduct towards reagents it resembles somewhat arbutin; like this substance, which, however, forms long needle-shaped crystals, it reduces, when heated for a short time with very diluted sulphuric acid, an alkaline copper solution; besides that it gives a blue colour with phosphomolybdic acid and ammonia, a reaction which cannot be used any longer for the detection of arbutin in a liquid, and the only value of which is, consequently, that by means of the same the absence, but not the presence, of arbutin can be ascertained.

Of the above reactions, the most interesting is the one which shows that the bitter principle of the cranberry is converted by boiling with dilute acids into glucose and another, as yet unknown substance, and that in consequence of this fact it belongs to the glucosides.

Pangium Edule. J. M. Maisch. (*Amer. Journ. Pharm.*, November, 1885, 562.) Attention has been recently directed by Chatel (*Journ. de Méd. de Paris*) to the medicinal properties of this tree, which are well known in the East Indian islands, where the tree is indigenous and cultivated. It belongs to the natural order *Bixaceæ*. It attains a considerable size, and has alternate, stipulate, long-petiolate, smooth, and dark green leaves, which are about 10 inches long, cordate, entire or trilobed, and five- to seven-nerved. The large flowers are axillary, the pistillate ones solitary, and the staminate ones cymose. The fruit is a large globular or ovate indehiscent berry, with a red-brown or grey-brown punctate pericarp, resembling that of the pomegranate. Imbedded in the

pulp are numerous seeds attached to parietal placentas, and of an irregular globose and angular shape, one side being marked by the elongated hilum; the testa is hard and woody, dark grey or blackish, rough from projecting branching veins forming an irregular net-work, and incloses a fleshy and oily albumen surrounding a large embryo with a conical oblique radicle, and with two foliaceous, palmately veined, cordate cotyledons.

According to Blume, quoted by Baillon, the plant contains a viscous extractive matter and an alkaloid resembling menispermine. All parts of the plant are said to possess anthelmintic properties, and a narcotic action, producing headache, drowsiness, nausea, and a kind of intoxication and delirium, which may terminate in death. This applies to the bark, leaves, fruit, and seed, the bark as well as the leaves being also used for stupifying fish. The leaves have an unpleasant acrid taste, and are often employed topically against cutaneous affections and ulcerations. The seeds are used for destroying body lice; after boiling and subsequent maceration in cold water, or after being roasted, they are harmless, and are used as a condiment. A fixed oil is obtained from them, which has a nutty flavour, and is used, like olive oil, in preparing aliments, but has a purgative action upon those not accustomed to its use.

Pangium is botanically related to *Gynocardia* (chaulmugra) and *Hydnocarpus*.

Boletus Luridus and Amanita Pantherina. R. Böhm. (*Chem. Centr.* [3], xvi. 249-251.) *Boletus luridus* belongs to the class of not very poisonous fungi, and its composition varies in different seasons. It contains large quantities of choline, together with a body similar to cholesterolin, small quantities of muscarin, and an acid (luridic acid) crystallizing in brilliant red needles, and yielding succinic acid on distillation. *Amanita pantherina* contains essentially the same substances, but its acid crystallizes in yellow crusts.

Syzygium Jambolanum. J. M. Maisch. (*Amer. Journ. Pharm.*, September, 1885.) The fruit of this tree is stated by Banetralla to have been used with good results in glycosuria, causing within forty-eight hours after its administration a considerable decrease in the amount of urine, and a complete disappearance of sugar. The rind of the fruit is said to contain the active principle (*Rev. de Thérap.; Lond. Med. Record*).

The leaves of this tree differ from those of most other myrtles in not being pellucid punctate; they are short petiolate, three or

four inches long, smooth, leathery, varying between oval and obovate-oblong, and between acuminate and very obtuse, the West Indian form being rounded at the apex. The flowers are in lateral panicle cymes, clustered, and have the calyx limb truncate or nearly entire. While the ovary is two-celled and multiovulate, the berry is one-celled, and contains only one or a few seeds. The seed is globular, and the embryo consists of two fleshy hemispherical peltate cotyledons, the short radicle being attached to their lower half, and concealed between them.

Alveloz. (*Amer. Journ. of Pharm.*, July, 1885, 328.) Alveloz is the name of a plant which has been sent by the American Consul at Pernambuco to the State Department, with the statement that it belongs to the *Euphorbiaceæ*, and that several cases of alleged cancer had been cured by its application. Unlike condurango, which was an alleged internal remedy for cancer and syphilis, alveloz is an external application. Its mode of operation is similar to that of jequirity. A profuse suppuration follows its application to a granular surface. The drug was used in Washington by Dr. Smith Townshend in a case of lupus of the nose, which was of nearly forty years' standing, and had resisted all previous treatment. The ulcer was cured within a few days.

Guacamacha. Dr. R. Kobert. (*Pharmaceutische Zeitung*, 1885, 483.) The author summarises the statements of different authors respecting the "guacamacha," a plant that is credited throughout Venezuela with prodigious toxic properties, and has been recently identified as *Malonetia nitida*, Spruce. He expresses an opinion that it probably enters into the composition of curare, and, in support of this theory, he refers to the variable action of curare, which is consistent with Professor Planchon's view that various plants are used in the preparation of that drug; in addition, he states that in the Orinoco and Rio Negro districts, from which the best kind of curare comes, the *Malometia nitida* is not unfrequent. Moreover, the physiological action of an alkaloid isolated from the plant a few years since (*Year-Book of Pharmacy*, 1883, 214) resembled that of curare so closely as to be hardly distinguishable. Indeed the author believes that guacamachine and curarine will prove to be identical, and he suggests that an investigation of the subject might place at the disposal of the medical profession a more uniform and therefore more trustworthy preparation than curare.

Lycopodium Saussurus. M. Adrian. (*Comptes Rendus*, June 7, 1886.) This plant, which is known in Brazil under the name

of "piligan," is found by the author to contain an alkaloid, for which he suggests the name "piliganine." This body is obtained by exhausting the powdered plant with boiling water, evaporating the liquid to a soft extract, exhausting the extract with alcohol, precipitating with acetate of lead, and removing excess of lead. The clear liquid is then neutralized by tartaric acid, which is added to slight excess, and filtered. The product is distilled, resin precipitated by the addition of water, and the aqueous solution, after filtration, treated with carbonate of soda and then with chloroform, which on evaporation or distillation leaves impure piliganine. When purified by re-solution and re-precipitation, the alkaloid forms a soft mass of a light yellow colour and transparent, and has a strong odour recalling that of pelletierine. It has an alkaline reaction, and emits white vapours in presence of hydrochloric acid gas. It is soluble in water, alcohol, and chloroform, although but little soluble in ether. The hydrochlorate is deliquescent. Its action on animals is that of a powerful emetic and cathartic.

The Active Principle of *Polygonum Hydropiper*. C. J. Rademaker. (*Amer. Journ. Pharm.*, June, 1886, 279.) A short time ago H. Trimble and H. J. Schuchard published an analysis of smart-weed (*Polygonum Hydropiper*), on the strength of which they asserted that this plant yielded no crystalline principle, and that the polygonic acid obtained by the author was merely a mixture of impure tannic and gallic acids, together with a small amount of colouring matter. In reply to this statement, the author now reasserts the existence in this plant of an active crystalline principle, described by him as polygonic acid, and supplies further details respecting its extraction and properties, together with a woodcut illustration of its crystals.

Polygonic acid may be prepared by treating smart-weed with water, to which some bicarbonate of sodium has been added, and allowing to macerate for twenty-four hours; or by precipitating a fluid extract of smart-weed with basic acetate of lead. In each case separate the base by means of sulphuric acid, and the organic acid by means of ether. Allow the ethereal solution to evaporate, and treat the residue with distilled water, and filter; this separates the resin (resinous acid). The filtrate is then filtered through animal charcoal repeatedly, until all colouring matter is removed. The filtrate is then treated with a solution of gelatin, in order to remove any tannic acid that might be present, again filtered, and evaporated to dryness, redissolved in ether, and the ethereal solution allowed to evaporate spontaneously.

Polygonic acid thus prepared crystallizes in needles. Its solution in water does not precipitate gelatin nor produce a bluish green coloration when added to a mixture of ferrous and ferric salts in solution, showing absence both of gallic and tannic acids. It is freely soluble in water, less so in ether, and insoluble in petroleum spirit. The heat of a water-bath does not destroy any of its properties.

The Common Sow Thistle as a Caoutchouc-yielding Plant. Dr. G. Kassner. (*Archiv der Pharm.*, July 1, 1885; *Chemist and Druggist*, August, 1885.) The author has found that *Sonchus oleraceus*, a plant which also grows wild in England, contains one-fourth per cent. of caoutchouc. An extract of the plant was made by extracting with benzine, petroleum ether, or sulphide of carbon, and this crude extract then boiled with alcohol, which dissolved nine-tenths of the extract. The residue is the raw caoutchouc, which requires warming with an alcoholic solution of potash, and then washing with hot water. The residue consists of an elastic, somewhat dark, caoutchouc, which is partly soluble in ether, but completely so in sulphide of carbon or chloroform.

Plants used in Medicine in Manchuria. (*Pharm. Journ.*, 3rd series, xvi. 268.) In some remarks upon the botany of South Manchuria, by Dr. Morrison, acting medical officer to Her Majesty's Consulate at Newchwang, which have been appended to a recent consular report, the following plants are enumerated as being used medicinally:—

Clematis tubulosa.—The stems of *C. tubulosa* are reputed to possess anthelmintic, cholagogue and stimulant tonic properties. During the year 1884, 51,733 lbs. were exported from this port, value £181 10s.

Aconitum Anthora, *Aconitum barbatum*, *Aconitum Fischeri* (?). Roots of these three species are used in medicine: properties attributed, stimulant, diuretic, alterative. Exported in 1884, 13,866 lbs.; value, £67 18s. 6d.

Thalictrum rubellum, *Cimicifuga simplex*, *Cimicifuga japonica*.—Roots of these three plants used in medicine: reputation, tonic and useful in leucorrhœa, amenorrhœa, and prolapsus ani.

Pæonia albiflora.—Root used in blennorrhagia and diseases of women. Export in 1884, 13,733 lbs.; value, £29 14s.

Pæonia rubra.—Bark; alterative and carminative.

Papaver somniferum.—Now cultivated extensively throughout Manchuria for the opium it yields.

Althæa rosea.—Cultivated, not extensively, chiefly for the dye

extracted from the very dark coloured petals; medicinal properties are also ascribed to it.

Dictamnus Fraxinella.—Used in medicine for its aromatic and tonic properties. Exported in 1884, 11,066 lbs.; value, £26 19s.

Glycyrrhiza glabra, *Glycyrrhiza echinata*.—Two roots used medicinally; properties, tonic, alexipharmic, and alterative. Exported in 1884, 108,533 lbs.; value, £469 19s. 6d.

Caragana flava, *Caragana microphylla*.—Roots used medicinally. Tonic, emollient, restorative. Exported in 1884, 3,866 lbs.; value, £10 14s. 6d.

Pterocarpus flavus.—Useful in rheumatism; tonic and diuretic. Exported in 1884, 32,533 lbs.; value £85 10s. 6d.

Dolichos soja (? *Soja hispida*).—The bean of commerce, yielding oil, bean cake, food for cattle, etc., and the residue, after expression, manure for sugar cultivation. Exported in 1884: (1) beans, 283,558,666 lbs.; value, £512,939 18s.; (2) bean-cake (expressed residue after crushing), 250,133,280 lbs.; value, £370,137 12s. 6d.; (3) bean-oil, 2,742,906 lbs.; value, £19,345 16s. Besides the above, Chinese gardeners mention eighteen named varieties of beans, including different genera and species.

Arachis hypogea (ground nut).—Cultivated near Liaoyang.

Prunus Cerasus.—The bitter kernels of the common wild cherry and bird cherry are used in medicine in dropsy, rheumatism, and cardialgia. Exported in 1884, 11,333 lbs.; value, £245 6s.

Prunus species.—Fruit used in medicine as a laxative. Exported in 1884, 45,733 lbs.; value, £360 5s. Chinese mention two varieties of plum, the wild and the cultivated, and five varieties of apricot, and one variety of cherry.

Bupleurum octoradiatum.—Roots used in medicine. Properties, antiphlogistic, arthritic, derivative. Export *nil*.

Libanotis sibirica.—Roots used in rheumatism, chills, catarrh, etc., as a diuretic and eliminative remedy. Exported 1884: first quality, 98,733 lbs.; value, £696 2s. 6d.; second quality, 41,866 lbs.; value, £191 19s.

Cicuta species.—Root used as a stimulant and antispasmodic. Exported in 1884, *nil*.

Angelica species.—Stomachic, tonic, and carminative. Exported 1884, 22,666 lbs.; value, £70 13s. 6d.

Panax Ginseng.—The favourite remedy of the Chinese in all forms of debility or severe disease; its properties seem to be tonic, stimulant, and carminative. Foreign Customs statistics, 1884: Exported during the year: Manchurian ginseng, 170,400 lbs.;

value, £15,371 13s. 6d.; Corean, first quality, 17,600 lbs.; value, £30,277 2s. 6d.; Corean, second quality ginseng, 333 lbs.; value, £285 3s. 6d.; wild ginseng, 183 lbs.; value, £2,312 9s. 6d.; imitation wild, 704 lbs.; value, £313 15s. 6d.

Aralia palmata (or *Acanthopanax spinosum*).—Bark used in rheumatism, etc. Exported in 1884, 22,800 lbs.; value, £66 11s.

Atractylis chinensis, *Atractylis rubra*.—Roots used in medicine. Tonic, stimulant, diuretic, and in chronic dysentery. Exported in 1884, 130,533 lbs.; value, £411 8s.

Adenophora verticillata, *Adenophora trachelioides*.—Roots used in medicine. Pectoral, emollient. Exported in 1884, *nil*.

Plantago asiatica.—Seeds used in medicine. Diuretic, pectoral, tonic, anti-rheumatic. Exported in 1884, 60,800 lbs.; value, £285 14s. 6d.

Gentiana asclepiadea or *squarrosa*.—Roots used in medicine, in ophthalmia and hæmaturia as an antiphlogistic. Exported in 1884, 9,800 lbs.; value, £95 19s. 6d.

Sesamum indicum.—Cultivated for the oil obtained. The seeds also used in confectionary preparations. Medicinal properties are also ascribed to the fruits and the oil expressed from sesamum seed. Exported in 1884, 414,000 lbs.; value, £1,897 4s. 6d.

Cuscuta monogyna, *Cuscuta europæa*.—Seeds of both used in medicine; tonic, diaphoretic. Exported in 1884, 75,200 lbs.; value £171 12s.

Lithospermum erythrorrhizon.—Root used medicinally in small-pox and anæmia. Exported in 1884, 533 lbs.; value, £12 8s. 6d.

Scutellaria viscidula.—Root used in medicine. Emollient, pectoral, anthelmintic. Exported in 1884, 10,000 lbs.; value, £33 5s. 6d.

Viscum articulatum.—Stems used medicinally in disorders during pregnancy and after confinement. Exported, 1884, *nil*.

Heterotropa asaroides.—Used in medicine as an emetic, diaphoretic, diuretic, and purgative, and in rheumatism and apoplexy. Exported in 1884, 272,933 lbs.; value, £2,294 17s.

Ricinus communis.—Cultivated. Oil only used in cooking by Chinese. Castor oil is extracted by foreign houses, and exported 101,333 lbs.; value, £744 19s. 6d.

Ephedra vulgaris, *Ephedra flava*.—Roots and stems of both species used in medicine; properties attributed, derivative, sudorific. Exported, 1884, 130,533 lbs.; value, £411 8s.

Allium.—The ordinary species cultivated among the Chinese are the chive (*A. schœnoprassum*), shallot (*A. ascalonicum*), garlic

(*A. sativum*), and other species; and onion (*A. Ceba*). Besides forming a favourite stimulating relish when mixed with other kinds of food, the Chinese ascribe various medicinal properties to the different members of the group.

Equisetum ramosum.—Stems, used as an astringent, and for inflamed eyes. Exported in 1884, 31,733 lbs.; value, £86 18s.

The medicinal plants noted are only such as are exported from the port of Newchwang, and in quantities sufficient to entitle them to separate classification.

Useful Plants of the Natural Order Verbenaceæ. J. M. Maisch. (*Amer. Journ. of Pharm.*, 1885, 330–335.) This paper contains notices of *Tectona grandis*, *Gmelina arborea*, *Avicennia tomentosa*, *Clerodendron infortunatum*, *Vitex Negundo*, *V. incisa*, *V. Agnus-casti*, *Lantana Camara*, *L. nivea*, *L. mixta*, *L. odorata*, *L. involucrata*, *L. trifolia*, *L. nodiflora*, *L. lanceolata*, *L. citriodora*, *L. mexicana*, *L. graveolens*, *L. dulcis*, *L. callicarpifolia*, *L. organoides*, *Verbena Aubletia*, *V. erinoides*, *V. teucrifolia*, *V. multifida*, *V. chamædriifolia*, *V. teucroides*, *V. phlogiflora*, *V. ciliata*, *V. bracteosa*, *V. hastata*, *V. urticifolia*, and *V. jamaicensis*.

The author's observations show that the plants of the natural order *Verbenaceæ* possess tonic and stimulant properties, and that those growing in tropical or subtropical countries are frequently aromatic, and some of them acrid. Considering the fact that the species of the temperate climates are destitute, or nearly so, of aromatic properties, and contain bitter and astringent principles only to a limited extent, it is not surprising that they are apparently not possessed of any decided medicinal virtues, and that they have received but little attention from the pharmacist and still less from the chemist; but it is likely that many of those growing in warmer climates may open an interesting field for chemical research on the nature of their volatile oils, their bitter or acrid principles, their tannins, and possibly other constituents.

Volatile Constituents of Ranunculaceous Plants. H. Beckurts. (*Chem. Centr.*, 1885, 776–778; *Journ. Chem. Soc.*, 1886, 365.) The author has examined the volatile constituents of *Anemone nemorosa*, *Anemone pratensis*, and *Anemone pulsatilla*. By distillation with water, and subsequent treatment of the distillate with chloroform, *anemone-camphor*, *anemonin*, *anemonic acid*, and a yellowish oil were obtained.

Anemone-camphor crystallizes in hard, shining, rhombic prisms, which do not melt, but evolve water at 150°, and char above 300°. It has a powerful, irritating odour, and a vesicating action. The

solutions of the substance spontaneously decompose, yielding a compound soluble in chloroform, and anemonic acid insoluble in chloroform and water. This is noticed in preparing the compound from the plants, the distillate rapidly becomes turbid from the separation of anemonic acid. The loss of acidity in the plant when kept, and in the pharmaceutical preparations of *pulsatilla*, is due to the same cause.

Anemonin, $C_{15}H_{12}O_6$, forms odourless, rhombic crystals, melting at 150° . It is soluble in chloroform, less soluble in alcohol and water, insoluble in ether. Anemonin distils with steam, and the aqueous solution reduces gold, platinum, and silver salts. It is unacted on by acetic acid and by benzoic and phosphoric chlorides, but is decomposed when boiled with hydrochloric acid, forming a dark-red, highly fluorescent liquid, which when evaporated leaves an amorphous, hygroscopic mass, having the properties of an acid. The salts are amorphous and difficult to purify. This acid, which has the formula $C_{15}H_{14}O_7$, is formed from anemonin by the assimilation of a molecule of water.

Anemonic acid is a yellowish white, amorphous powder, insoluble in water, alcohol, and ether.

The *yellowish oil* has a sharp, irritating smell, and is a powerful vesicant. It gradually solidifies, forming a hard, white, horny mass without odour, which is resolved by alcohol into anemonin and anemonic acid.

Glycyrrhizin in Myrrhis Odorata. L. J. Schroeder. (*Archiv der Pharm.* [3], xxiii. 621, 622.) Guignet has remarked the presence of glycyrrhizin in plants not belonging to the *Papilionaceæ*. This induced the author to examine *Myrrhis odorata*, both by Robiquet's method and that of Guignet. The latter (treatment with acetic acid, then with alcohol, and after concentration, separation by means of water, etc.) gave unsatisfactory results. The plant was treated with aqueous ammonia, sulphuric acid added to the filtrate, the precipitate evaporated to dryness with barium carbonate, treated with alcohol, and the filtrate evaporated. Repeated attempts were made to obtain a crystallized product, but without success. The reactions of glycyrrhizin were obtained.

Polyporus Senex. M. Grossi. (*Amer. Drugg.*, 1885, 155.) *Polyporus Senex*, a gigantic species of agaric found on the coast of Chili, has been used by the author as a styptic and to arrest night sweats. For the latter purpose he combines $3\frac{1}{4}$ grains of the drug with 15 grains of sodium bicarbonate, 3 ounces of distilled water, and 75 grains of gum arabic, giving a tablespoonful at night.

Ergot of Diss. E. M. Holmes. (*Pharm. Journ.*, 3rd series, xvi. 684.) The author supplies the following interesting information respecting this drug. We reproduce it in full, as it is not suited for condensation.

The ergot of diss derives its name from the reed on which it grows, *Ampelodesmos tenax*, Link, which is called diss by the Arabs of Algeria. The plant is very common on all the litoral region of Algeria, and is found also in Corsica, Sicily, and Italy.

It is known to botanists by the following synonyms:—*Arundo ampelodesmos*, Cyr. Neap.; *Arundo festucoides*, Desf.; *Arundo mauritanica*, Poir.; *Arundo tenax*, Wahl.; *Donax tenax*, Pal. de Beau. It is figured in Desf., "Atlas," I, t. xxiv.; Cyr. Neap., t. xii.

The plant grows from six to ten feet high, and has a spreading or turf-like habit of growth. The panicles are elongated, somewhat interrupted and pendulous, or curved towards the summit. The leaves are very tough, straight, elongated and channelled, and acute at the apex, the upper surface and the margin being rough to the touch. The rhizome has recently been introduced into use in homœopathic medicine. The ergot which is found on this plant was first detected in 1842 by M. Durieu de Maisonneuve, a member of the Scientific Commission of Algeria. It differs from ergot of rye in being barely half its diameter, but twice or thrice its length. It varies, however, considerably in size, from 3 to 9 centimetres in length, and from 2 to 2½ millimetres in diameter, this ergot being probably larger in proportion to the size of the seed on which it grows than any other, except perhaps that of the Timothy grass (*Phleum pratense*, L.).

Shortly after the discovery, by Tulasne, of the mode in which the sclerotium or ergot develops the fructification of the fungus known as *Claviceps purpurea*, M. Durieu de Maisonneuve, following the process adopted by Tulasne, cultivated the sclerotium of the ergot of diss, and obtained the same fructification that is produced by the ergot of rye. Notwithstanding the difference in size and shape of these and of the ergots of several other grasses, it would appear that all that have yet been cultivated must be referred to the same fungus. If this be true, it becomes an important fact in its relation to agriculture, since unless ergot in grasses be kept down or destroyed, the crops of cereals must suffer. That the different forms of ergot possess the same properties appears evident from the injury to cattle from ergotized grasses that has been reported of late years.

The ergot of diss when small is slightly curved, but when long

(6·9 centimetres) it takes a spiral turn from right to left, the longitudinal furrows being present on the inner face; being of less diameter than ergot of rye, it is drier and more brittle. It is collected in June, July, and August, during dry weather. If collected later, the sun appears to have an oxidizing effect on the ergot. In September the ergot is found to contain less oil. In a dry place it keeps well, being less hygroscopic than ergot of rye. M. Lallemand, of Algiers, who introduced this ergot into use in medicine in 1860, says that he has kept it for three years without any visible alteration, and has never noticed on it the acarus which attacks the ordinary ergot of commerce. He remarks, however, that the acarus does not attack ergot of rye so long as it is dry, but appears as soon as the drug becomes damp.

M. Lallemand has made a chemical examination of the ergot of diss. He finds that the oily fluid exhausted by chloroform, ether, or bisulphide of carbon, separates into two layers. The upper is not saponifiable, and if distilled it is partly decomposed. The lower layer is of a thick consistence, and holds in suspension opaline flakes, apparently of resinous matter. It is inflammable, and becomes brown when heated. Administered to a dog, both oils produced poisonous symptoms, causing vomiting, slowness and weakness of the pulse, extreme thirst, and feebleness of the hind legs. M. Lallemand agrees, therefore, with those who consider the oil to be poisonous, and who believe that it should be removed from ergot.

By treating with boiling alcohol the residue left after exhaustion by ether, reducing the alcoholic liquid to a small volume, and adding to it distilled water or a few drops of nitric acid, the ergotine of Wiggers is precipitated. This appears to be of the nature of an acid resin, since it is insoluble in hot water and ether, soluble in cold, but still more readily in boiling alcohol; also in caustic but not in carbonated alkalies. It also dissolves in sulphuric and acetic acid, colouring these liquids.

M. Lallemand finds that the ergot of diss contains 2·30 per cent. of this ergotine and 30·60 per cent. of the oils, but that samples of ergot gathered in the same week in different localities yield different percentages of these constituents.

Ergotine prepared as above described, washed with distilled water and dried, presents the appearance of a reddish brown powder.

The extract called ergotine by Bonjean can be obtained from the ergot of diss as follows:—The powdered drug is moistened with

distilled water and allowed to swell for three or four hours. It is then packed lightly in a percolator, and distilled water allowed to pass through it; but unless the powder has swollen to its full extent before packing, filtration becomes impossible.

The percolate is evaporated as soon as practicable on a water-bath or at a low temperature, and when reduced to the original weight of the ergot, it is filtered to separate the albuminous matters that are precipitated by the heat employed. The filter is washed with distilled water, and the washings added to the filtrate, which is again evaporated to a clear syrup. To this is added twice its weight of 86° alcohol, by which gummy matters are precipitated. The decanted liquor is again reduced to a syrupy consistence. Thus treated, the ergot of diss yields a little over one-sixth of its weight of fluid extract.

This extract, or ergotine of Bonjean, is hygroscopic, of a clearer brown-red than that made from ergot of rye. At first the taste is sweet, then slightly acid. It is very soluble in water, and the solution reddens litmus slightly.

The above preparations of ergot of diss have been employed by Drs. Fourmeaux, Lelièvre, and Charbonnier. M. Lallemand records two cases: one in which the powdered ergot was given as a parturient, in two doses of 0.50 gram, with an interval of twenty minutes, with excellent results; and the other in which the fluid extract was given in a severe case of hæmoptysis, and at once arrested the bleeding, which did not recur again. The ergot of diss is alleged to be twice as strong as the ergot of rye, only half the dose being necessary to produce the same effect. It can be obtained at a much lower price, as it is abundant and easily collected. Being less hygroscopic and readily attacked by acari, and apparently possessing properties identical with those of ergot of rye, it seems worthy of the attention of the medical profession in this country.

Cyprian Drugs. W. T. Thiselton Dyer. (*Pharm. Journ.*, 3rd series, xvi. 385.) The drugs discussed in this paper are *Cyprian turpentine* and *gum Labdanum*. As the paper is not suited for condensation, reference should be made to the original article in the above source.

A further notice of gum Labdanum of Cyprus, by the same author, will be found in the same journal, p. 779.

Spruce Gum. (*American Druggist*, October, 1885.) Spruce gum, in quantities, is gathered principally in Canada; that is, the largest and best lots come from the Dominion, although Maine, New

Hampshire, and Vermont contribute something towards the annual yield. The "run" of the gum is made during the months of August and September, evidently caused by the excessive heat of those months in the northern latitudes, and it stands in various fantastic shapes upon the bark of the trees, until the intense cold of the winter hardens it up. The first year the gum is white and sticky. After that it commences to turn red, and in the second year it is fit to "pick" for the market. If allowed to remain on the trees until the third year, however, the gum is of a better quality. It remains in that condition for a number of years, then it begins to "turn old," as it is called. At this stage very few can detect the deterioration in quality. The principal fault found with it, if sold to the consumer, is that it will soon "chew hard" and crumble quickly. A little more age makes it of a dark colour, and finally the gum is old and bitter, and consequently worthless. Much of the gum which looks all right upon the outside will contain bark, and chew bitter; hence the peculiar sort of experience necessary for the dealer, as none but persons used to handling it can detect such gum. Vermont gum will not run out as clear as the Canada product. What is produced in Vermont is called "seam gum"; that is, it runs out of a seam of a tree, and usually contains a quantity of bark. Canada gum runs out of the limbs in clear pieces, and from the body of the tree, wherever the heat is such as to crack the bark. Large, clear pieces, four to six inches in length, are often found.

The remainder of the report describes the picking and cleaning of this gum, for the details of which reference should be made to the original article, or to a reprint in the *Pharmaceutical Journal*, 3rd series, xvi. 370.

Examination of Gum Arabic for Adulterants. Dr. H. Hager. (*Pharm. Centralhalle*, 1885, 388.) A mixture of ferric chloride and potassium ferricyanide in solution is a certain and delicate reagent for artificial gum made from dextrin. The reagent is prepared by mixing fifteen drops of the pharmaceutical solution of ferric oxide with fifteen drops of the cold and saturated solution of potassium ferricyanide, and five drops of dilute hydrochloric acid (sp. gr. 1.165) with 60 c.c. of water. If 6 c.c. of a 20 per cent. solution of the sample of gum be treated with 3 c.c. of this reagent, pure gum yields a clear *yellow*, viscous liquid, which remains unaltered from eight to ten hours. If, however, dextrin be present, the yellow colour changes either at once or in the course of an hour, and in two to three hours the mixture has become *blue*.

Detection of Gamboge in Mixtures. (*Pharm. Zeitschr. für Russland*, xxiv. 609; *Amer. Journ. Pharm.*, December, 1885, 606.) Solutions containing gamboge are mixed with powdered glass, evaporated to dryness, powdered, and treated with benzin. If the benzin solution is colourless, it is again shaken with the powder and sufficient hydrochloric acid to make the solution decidedly acid. Benzin does not dissolve gamboge in presence of soap. If after treating with benzin and acid, the benzin solution is colourless, no gamboge is present. If, however, the solution has a yellow cast, it is filtered, and tested as follows:—To a small portion of the filtrate is added a dilute solution of caustic soda; if a red coloration is produced, gaseous ammonia is led into the remaining solution until it is saturated. The flakes which separate out are collected on a filter and washed with benzin before dissolving them in alcohol. This solution, treated with an alcoholic solution of ferric chloride, turns black, and on adding caustic soda the colour changes from black to dark yellow, but never red, if gamboge is present. By this method Hirschsohn was able to detect 0·01 gram of gamboge.

Convolvulin and Jalapin. J. M. Maisch. (*Amer. Journ. of Pharm.*, September, 1885, 456.) These resins, after having been taken internally, could not be detected by Bernatzic (1862) in the urine, and in the fæces only after very large doses had been given. Köhler and Zuricke (1869), succeeded in proving their presence in the contents of the stomach and intestines. In a series of experiments with cats, made in Dorpat by Dr. J. Müller ("Thesis," 1885), the compounds named, or their derivatives, were shown to be absent from the fæces, urine, kidneys, and bladder; the reactions were quite distinct with blood, stomach, jejunum, and ileum; faint with duodenum and the large intestines; and very faint with heart, lungs, and spleen. A cat having been killed five hours after taking 0·5 grain jalapin, showed a relatively distinct reaction in the blood; but the different organs gave either a very faint reaction or none.

The process for separating the resins was selected after a series of experiments as follows:—The mass was macerated for a day with three times its weight of 96 per cent. alcohol, the filtrate concentrated, acidulated, agitated with petroleum benzin for the removal of impurities, and afterwards with chloroform, on the evaporation of which the resin was left behind. Blood treated in the same manner leaves a residue giving the same reaction, but after treating this residue with absolute alcohol, filtering and

evaporating, the residue left from blood does not show the reaction, except in the presence of the resins named. The test used for the colour reaction was concentrated sulphuric acid, about ten drops, which dissolves the resins; the solutions on the careful addition of water show a red colour within a few minutes, which, however, disappears rapidly; but if the solution be allowed to absorb moisture from the atmosphere, the reaction takes place slowly in about an hour, and continues for a longer time.

Examination of Commercial Copaiba Balsam. E. Praël. (*Archiv der Pharm.* [3], xxiii. 735-754, 769-779. *Journ. Chem. Soc.*, 1886, 284.) The author has examined 15 samples of copaiba balsam, and gives the results in tabular form, showing the physical characteristics of the samples, and their behaviour with various solvents. He then considers the various methods of adulterating copaiba balsam. The sp. gr. varied from 0.916 (Para) to 1.009 (angostura raw), or, omitting the last, which might contain water, 0.995 (Maracaibo). The amount of resin varied from 23.87 per cent. (Para) to 61.43 per cent. (Maracaibo). The sp. gr. of the ethereal oil yielded by the samples was 0.897, 0.908 (Para and Bahia respectively). All varieties gave clear solutions with carbon bisulphide, chloroform, amyl alcohol, and benzene. Absolute alcohol gave a slight turbidity in three cases; this usually indicates the presence of a fatty oil (other than castor oil); still the samples in question appear to be free from such oils. With chemical reagents the results obtained agreed generally with those given by Hirschsohn (*Archiv der Pharm.*, ccxi. 162, 177).

Adulteration with fatty oils, with gurjun balsam, turpentine oil, sassafras oil, colophony, and similar resins, is also discussed by the author. To detect colophony, he recommends powdering two grams of the residue left on heating the balsam over a water bath, and stirring vigorously with ten times its weight of 70 per cent. alcohol; after an hour it is filtered, and the filtrate treated with a gentle current of hydrogen chloride for half an hour. No yellow resinous precipitate should appear.

Test for the Purity of Peruvian Balsam. A. Andrée. (*Archiv der Pharm.* [3], xxii. 561-576.) The author discusses various proposed methods as far as concerns tolu-balsam, benzoin, and storax; the first two are detected with certainty by Hager's light petroleum process, when an increased resinous residue is obtained, with a corresponding diminution in the cinnamein (benzyl cinnamate). The amount of acid in the cinnamein will show whether tolu-balsam or benzoin is the adulterant. Storax can be detected by

Schlickum's ether-ammonia test, in which the ether layer gelatinizes. Flückiger's test with lime is very good for the detection of such adulterants as form compounds with the lime on rubbing up in the cold, but it does not detect tolu-balsam.

Gutta-percha from *Bassia Parkii*. E. Heckel and F. Schlagdenhauffen. (*Comptes Rendus*, ci. 1069–1071; *Journ. Chem. Soc.*, 1886, 249.) Gutta-percha from *Bassia* (or *Butyrospermum*) *Parkii* (*Comptes Rendus*, c. 1239) resembles ordinary gutta-percha in its physical properties. It is obtained in compact, fibrous masses, which soften in warm water, and become adhesive at about the boiling-point. It becomes electrified as easily as the ordinary variety, and serves equally well as an insulator; sp. gr., 0·976.

The gutta-percha from *Bassia* is, however, much less soluble in light petroleum, terebenthene, ether, and boiling acetic acid, than the ordinary variety; but is almost equally soluble in carbon bisulphide, chloroform, benzene, and boiling alcohol of 95°.

The proportion of each variety dissolved by the different solvents is given in the following table:—

	Carbon Bisulphide.	Chloroform.	Benzene.	Ether.
Ordinary Gutta-percha . .	99·72	98·60	93·20	40·8
Gutta-percha from <i>B. Parkii</i>	97·92	98·28	92·80	20·1
	Light Petroleum.	Tere- benthene.	Boiling Acetic Acid.	Boiling Al- cohol of 95°.
Ordinary Gutta-percha . .	34·0	20	19·2	7
Gutta-percha from <i>B. Parkii</i>	18·1	8	12·8	7

When analysed by Payen's method, the product from *B. Parkii* yields gutta-percha 91·5, albane 6·0, fluavile 2·5 = 100, and is almost identical in composition with the commercial article. It leaves 1·2 per cent. of ash, which contains iron, manganese, calcium, sodium, potassium, lithium, silica, and sulphuric and carbonic acids.

Gutta-percha from *B. Parkii* is excellently adapted for the production of casts, moulds, etc.

Caoutchouc in Benzoin. C. Schmidt. (*Amer. Journ. Pharm.*, 1886, 331.) Ten ounces of Sumatra benzoin were reduced to a powder and macerated for seven days with an equal weight of alcohol. The resulting tincture was filtered. On examining the dregs on the filter, which seemed to consist chiefly of bark, the author noticed a whitish substance running through the dregs in fine veins, just below the surface. Upon taking hold of a vein, it was found to be elastic. This substance was easily separated from the

dregs, and washed with alcohol and water. Slight pressure between the fingers caused it to form into a mass very much resembling caoutchouc. It was forwarded to Prof. Power, of the University of Wisconsin, who examined it, and determined it to be really caoutchouc.

The author procured a second sample of Sumatra benzoin from another lot, but failed to find caoutchouc in it by the above simple process. In this second operation, the dregs remaining on the filter were dried and shaken with carbon disulphide. The clear liquid was poured off and evaporated spontaneously, leaving a light yellow residue. The portion insoluble in carbon disulphide was shaken with chloroform, and the clear solution poured off and evaporated spontaneously, leaving a light brown residue. Both these residues were examined at the John Hopkins University, through the kindness of Prof. Remsen, but no caoutchouc was discovered in either of them.

This would seem to indicate that the caoutchouc in the first specimen was an accidental impurity, and not a natural constituent of benzoin, as was at first supposed.

Uncaria Bernaysii. F. von Mueller. (*Austral. Journ. Pharm.*, February, 1886, 45; *Pharm. Journ.*, 3rd series, xvi. 919.) Under this name, a new Papuan species of *Uncaria* is described by the author, which, it is thought, will in all probability become of medicinal and industrial importance, as yielding gambier. It was collected during an expedition to New Guinea under the superintendence of Captain Everill, and is said to differ in many respects from *U. Gambier* and *U. acida*, the species cultivated as sources of catechin, especially in being much more robust in all its parts. Nothing appears, however, to be yet known as to the quality of the product obtainable from the *Uncaria Bernaysii*.

Eucalyptus Kino. F. v. Mueller. (*Pharm. Journ.*, 3rd series, xvi. 898.) An astringent exudation occurs in most species of eucalyptus, filling cavities or cracks in the wood and barks; when dry it is brittle, and presents an appearance similar to Indian kino. It varies greatly in different species, both in quantity and in character. According to Wiesner, it consists of a mixture of tannic acid, giving a dirty green precipitate with solutions of ferric salts, pyrocatechin, a little catechin, and a very variable quantity of a substance insoluble in water but soluble in alcohol, and which has been variously described as gum resin, kino-red, or eucalyptus-red.

The amount of the astringent exudation afforded by different species may be seen from the following table:—

	Per cent.	Per cent.
<i>E. leucoxyton</i>	21·94	
<i>E. macrorhyncha</i>	11·12 to 13·41	
<i>E. longifolia</i>	8·3	
<i>E. rostrata</i>	8·22	
<i>E. viminalis</i>	4·88 to 5·97	
<i>E. globulus</i>	4·84 to 5·97	
<i>E. resinifera</i>	4·38	
<i>E. goniocalyx</i>	4·12 to 4·62	
<i>E. melliodora</i>	4·03	
<i>E. obliqua</i>	2·50 to 4·19	
<i>E. polyanthema</i>	3·97	
<i>E. Gunnii</i>	3·44	
<i>E. amygdalina</i>	3·22 to 3·40	

The relative quantity of kino-red present in the tree appears to determine in great measure the value of its timber, as it renders the wood almost impervious to decay when under water, and prevents the attacks of insects and marine animals. The species in which it is most largely present contain from 17 to 19 per cent., as in *E. marginata*, *E. rostrata* and *E. robusta*, which are the most valuable of the timber trees of Australia for shipbuilding, piles, and similar purposes. The kino of *E. resinifera* also contains a quantity of kino-red, only one-sixth of it being soluble in water. It is to this last-named species that Botany Bay kino has generally been attributed; but the author states, on the authority of the Rev. Dr. Woolls, that it is much more extensively collected from *E. siderophloia*, to which indeed the name of *E. resinifera* has been applied by Allan Cunningham.

Several species yield a kino containing but little kino-red, and consequently dissolving readily in hot water, although forming a turbid solution when cold.

Those of the following species have been examined by Wiesner (*Pharm. Journ.*, 3rd series, ii. 102):—*E. globulus*, *E. leucoxyton*, *E. citriodora*, *E. amygdalina*, *E. pilularis* and *E. fissilis*.

There is great difficulty in ascertaining the exact botanical source of the eucalyptus kinos at present imported into this country, partly owing to the same name being applied to distinct trees in different parts of Australia. Thus the name of red gum, under which name a eucalyptus kino is employed in this country, is applied to *E. rostrata*, *E. tereticornis*, and in West Australia to *E. calophylla*. The first two of these yield a kino only partially soluble in water, while that of *E. calophylla* is easily soluble, and contains but little kino-red. This species is said by the author to afford a liquid kino in considerable quantity by tapping the

trunk. It is caught in casks as a material for tanning and dyeing purposes, and is said to fetch £20 to £25 per ton in the London market. It indurates on exposure to the air, and can then be used in medicine internally, like true kino, or in powder, as an application to wounds. Two species which yield a kino perfectly soluble in water are *E. obliqua* and *E. piperita*. That of the former resembles Indian kino in appearance, and forms a deep-red neutral solution; the latter is of a zircon-red colour, is translucent, and forms a yellowish red, neutral solution. The tannic acid of *E. obliqua* differs from that of most other species in giving a dark violet precipitate with solutions of ferric salts. The number of these inspissated juices suitable for replacing true kino in pharmacy is therefore very limited.

Turkestan Manna. V. Markownikoff. (*Journ. Chem. Soc.*, 1885, 943; from *Journ. Russ. Chem. Soc.*) This manna, secreted by a graminaceous plant, *Alhagi maurorum*, or *camelorum*, is used by the natives as a surrogate for sugar, and known under the name *tarondjabin*. The crude product was crystallized by evaporation of its aqueous solution at the ordinary temperature. The crystals proved to be a saccharose, not reducing Fehling's solution, and decomposed by acids, yielding an uncrystallizable glucose, which strongly reduces cupric oxide. It is considered by the author as identical with melizitose. The crystals contain 1 mol. of H_2O , which they lose at 100° . It melts at 140° . The rotatory power was found to be $[\alpha]_D = +88.07$. It seems to follow from these results that Turkestan manna is identical with the Persian one analysed by Villiers.

Three Chinese Fixed Oils. R. H. Davies. (*Journ. Chem. Soc.*, 1885, 1022.) The following new oils from China have been examined. Tea oil, from *Camellia oleifera*, resembles olive oil, but has a characteristic odour and taste. Its sp. gr. is 0.9175 at 15.5° . Solid matter separates, but it does not solidify at -13.3° . 100 parts of oil require 0.34 part of potash to neutralize the free acidity, and 19.55 parts of potash for saponification; it contains 93.92 per cent. of insoluble fatty acids, of which 83.15 per cent. is oleic, the remainder being probably a stearic acid. Cabbage oil, from *Brassica*, sp., resembles rape oil, has a strong, disagreeable odour, sp. gr. 0.914 at 15.5° , and forms a bright orange-yellow mass at -12° . 100 parts of oil require 0.125 part of potash for neutralization, and 17.52 parts of potash for saponification. The oil yields 95.32 per cent. of insoluble fatty acids, consisting mainly of an acid resembling brassic acid. Wood oil, from *Eleococcus cordata*, is brown

in colour, has a persistent and disagreeable odour, and is remarkable for its great drying properties. Its sp. gr. is 0.94015 at 15.5°; it does not solidify at -13.3°. Sulphuric acid carbonises it, whilst nitric acid forms a solid orange-yellow nitro-derivative. The free acidity of 100 parts of this oil neutralizes 0.39 part of potash; the oil requires 21.1 parts of potash for saponification, and yields 9.410 parts of insoluble fatty acids; by crystallizing this latter from alcohol, crystalline plates melting at 67° are obtained. This oil is distinct from Gurjun balsam, also known as wood oil.

Apricot, Peach, and Walnut Oils. T. Maben. (*Pharm. Journ.*, 3rd series, xvi. 797.) The author gives a full and interesting account of these oils, terminating with the following table, summarising their behaviour under certain conditions. Oil of almonds is inserted in the table for comparison.

	Apricot Oil. (Non-drying.)	Peach Oil. (Non-drying.)	Almond Oil. (Non-drying.)	Walnut Oil. (Drying.)
Specific gravity at 60° F. . . . .	.9204	.9232.	.918	.9261
Freezing point . . .	Slightly viscid at -20°C.	Slightly viscid at -20° C.	Opaque and viscid at -20° C.	Viscid and slightly opaque at -20° C.
Saponification: 1,000 parts of oil require parts KHO.	181.4	189.1.	183.0.	194.4.
Bromine absorption: 100 parts oil absorb parts Br.	70.0.	77.0.	53.74.	90.5.
Action of nitric acid	Coffee - brown colour.	Dark brown.	Action slight.	Dark brown.
Sulphuric acid . . .	Light-brown to red-brown.	Dark brown.	Yellow to orange.	Dark brown to purple.
Solution of chloride of zinc	Muddy - brown with shade of purple.	Purple brown.	No action.	Muddy brown.
Flaidin Test . . .	Light yellow, hard.	Citron yellow, soft.	White, hard.	Does not solidify.

Apricot oil is of a clear, pale yellow colour, with a distinct odour of hydrocyanic acid and amygdalaceous flavour. Peach oil is similar, but more intense in colour, odour, and taste.

The Fat of the Fruit of *Vateria Indica*. F. v. Höhnelt and J. F. Wolfbauer. (*Chem. Centr.*, 1885, 762.) There has lately been brought into commerce, under the name of butter beans, some peculiar fatty seeds, which are now identified as those of *Vateria indica*, a tree from which considerable quantities of vegetable tallow (Piney tallow, Malabar tallow) is derived. The air-dried seeds contain 49.2 per cent. of a greenish yellow, solid fat, which bleaches rapidly on exposure to light, and has a peculiar, agreeable,

balsamic odour. The fat is readily saponified, and yields a mixture of fatty acids, melting at 56.6° , and resolidifying at 54.8° . This mixture consists of oleic acid with solid fatty acids, which melt at 63.8° , and constitute about 60 per cent. of the vegetable tallow.

Adulteration of Olive Oil. A. Andoynaud. (*Chem. Centralblatt.*) The author recommends the following test for sesame, cotton, poppy, or earth-nut oil mixed with olive oil, if only to the extent of 5 per cent. :—

In a test-tube of 15 cm. length, 15 mm. diameter, and divided into cubic centimetres, a quantity of 2 cm. of the sample to be tested should be well shaken with 0.1 gram of powdered bichromate of potash, and nitro-sulphuric acid added, bringing the mixture up to 4 cm. When again agitated, the fluid assumes a red-brown colour. After one or two minutes ordinary ether at 65° is added, bringing up the contents to 5 cm., and the agitation is renewed.

The now greenish liquid seems about to form two layers, but after a short time a violent effervescence sets in, nitrous fumes escape, and finally the oil floats at the top, forming a green layer if pure. If containing at least 5 per cent. of foreign substances, the colour is greenish yellow, and becomes yellow, or even orange, if the oil be largely adulterated. The colour can best be observed by filling the test-tube with water to the tenth degree of division.

The Testing of Sweet Oil of Almonds. G. Vulpinus. (*Archiv der Pharm.* [3], xxiv. 59–64.) The author examined the *elaiidin* test, employing for that purpose samples of genuine almond oil, obtained from a respectable firm of dealers; oil pressed by himself from both sweet and bitter almonds; and the same oils mixed with known quantities of olive oil. The test was applied in three ways :—(a) 15 parts of oil were shaken up with a mixture of 3 parts of fuming nitric acid and 2 parts of water; (b) the same, with the addition of a fragment of copper; (c) equal volumes of oil and the acid mixture given in (a). The investigations show that the test gives very variable results, and confirms the assertion of Kremel and others, that it is not easy to found a satisfactory method upon it.

Examination of Essential Oils. Dr. H. Hager. (*Journ. Soc. Chem. Industry*, October, 1885.) For the examination of certain essential oils, chiefly with the view to distinguish the “natural” products from artificial imitations, the author employs an aqueous solution of mercuric nitrate (10 per cent.). Four drops of the essential oil are dissolved in 2 c.c. of alcohol, and 2 to 3 drops of

the nitrate solution added. No reduction occurs with the essential oils of laurel (ol. laurocerasi) and bitter almonds. The greater number of oils, however, have a reducing action on the nitrate, and their presence in admixture with the above is indicated by the formation of a grey precipitate of metallic mercury. The artificial bitter almond water also precipitates the solution, and is thus distinguished from the natural. The following oils—viz., ol. cassiæ cinn., succini petræ, linanthracis, vincæ, vitis viniferæ—do not readily reduce the nitrate, but their presence in bitter almond oil is indicated by the opalescence occasioned by diluting with alcohol (6 parts of sp. gr. 0.895). Mustard oil, treated under the above conditions, gives a slight reduction; the artificial products sold under this name were found, on the other hand, to reduce rapidly, giving a dark grey precipitate.

Tests for the Purity of Essential Oils. P. Carles. (*Journ. de Pharm.* [5], xii. 529–530.) There are three principal methods in use for this purpose. (1) The essence is agitated with its own volume of a fatty oil—olive oil, etc. If the mixture remains clear, the essence is supposed to be pure; but if the mixture becomes turbid, adulteration with alcohol is inferred. (2) The essence is agitated with its own volume of distilled water in a tube. The volumes of the two liquids are noted on the tube before shaking, and again after the tube has been allowed to remain for a few minutes. If alcohol is present, the volume of essence is diminished, and that of the water is increased. The author finds this method to be quantitative as well as qualitative. (3) A given volume of essence is agitated with a fragment of dried calcium chloride. The salt remains unchanged in pure essence, but in the presence of alcohol it becomes more or less liquid, according to the amount of this solvent present. The author finds that the first method may fail to detect as much as 20 per cent. of alcohol, whereas the second and third methods readily detect small quantities.

Essential Oil of Lime-Leaves. F. Watts. (Abstract of a paper read before the Chemical Society, February 18th, 1886. From the *Society's Proceedings*.) The fragrant yellow oil of the lime-tree (*Citrus limetta*) obtained by distilling the leaves and young shoots in a current of steam, contains a citrene, $C_{10}H_{16}$, boiling at $178-179^{\circ}$, and methylnonylketone; it appears also to contain "terpinol." On distillation, about one-half boils above 280° , and has the appearance of colophene.

Essential Oil of Lemon. G. Bouchardat and J. Lafont. (*Comptes Rendus*, ci. 383–385; *Journ. Chem. Soc.*, 1885, 1141.) The

authors have carefully fractionated essence of lemon, and examined the products obtained by the action of dry hydrogen chloride on the different fractions. In most cases distillation was conducted under reduced pressure. The results lead to the conclusion that essence of lemon is a highly complex substance, consisting mainly of hydrocarbons of the composition $C_{20}H_{16}$, and a little cymene. The most abundant of the $C_{20}H_{16}$ hydrocarbons is a citrene, which boils at about 178° , has a rotatory power higher than $+105^{\circ}$, and yields directly a solid inactive dihydrochloride. The essence also contains small quantities of several terebenthenes, which begin to boil below 162° , and yield monohydrochlorides differing from one another in their rotatory powers.

Detection of Oil of Turpentine as an Adulterant in Oil of Lemons. G. Heppe. (*Archiv der Pharm.* [3], xxiii. 349, 350.) The oil of lemon is heated in a dry test-tube with a piece of copper butyrate about the size of a pin's head; the temperature is slowly raised to 170° , but must not exceed 180° . If the oil of lemon is pure, the copper salt dissolves and colours the oil green. If turpentine oil is present, the oil becomes turbid, is coloured yellow, and reddish yellow copper protoxide is separated. The difference between the pure and the adulterated oil is very marked, both when warm and after cooling. The test appears very suitable for bergamotte oil and orange-peel oil.

The Essential Oil of Myrtus Communis. J. M. Maisch. (*Amer. Journ. Pharm.*, 1886, 299.) *Oil of Myrtus communis* is now discussed in medical journals under the name of "myrtol," with reference to the observations made by Dr. Linarix, and published in Paris, 1878, under the title of "*De l'emploi du myrtol ou essence de myrte principalement dans les maladies des voies respiratoires et génito-urinaires.*" The oil has antiseptic and disinfecting properties, does not irritate the unabraded skin, is a digestive stimulant, and, in large doses, produces nausea and headache, at the same time a violet-like odour being observed in the breath and in the urine. It is given in gelatin capsules containing 0.15 gm. of the oil, about six doses being taken during the day. The oil is recommended in various forms of catarrh, and as an antiseptic in certain putrid discharges; externally, also, in rheumatism and psoriasis.

Test for the Purity of Essential Oil of Peppermint. Fritsche Brothers. (*Pharm. Journ.*, 3rd series, xvi. 723.) It is alleged that since the preparation of menthol (pipmenthol) from American peppermint oil has extended, large quantities of this oil have been

placed upon the market from which the menthol had been first removed, rendering them inferior in therapeutic value and aroma. In order to detect this fraud, the authors recommend that a test-tube partially filled with the oil, and corked, should be placed in a freezing mixture of snow and salt for ten or fifteen minutes. At the end of that time, if the oil has not been tampered with, it will have become cloudy, and of a jelly-like consistence. If then four or five small crystals of menthol be added, and the tube be replaced in the freezing mixture, the oil will after a short time form a solid frozen mass of crystals. If the oil remain limpid, or partially so, it is a sign that it has either been adulterated or that the menthol has been removed from it.

Chemical Relation between the Oils of Peppermint and Spearmint. H. Trimble. (*Pharm. Journ.*, 3rd series, xvi. 345, 346.) The author's conclusions are embodied in the following summary:—

1. The oils of spearmint and peppermint probably contain hydrocarbons which are identical.

2. These hydrocarbons exist in much smaller proportion than heretofore supposed, and are isolated with great difficulty.

3. Oil of spearmint contains, as the oxygenated portion, carvol, $C_{10}H_{14}O$, which does not solidify at $-23^{\circ}C.$, and is precipitated by alcoholic ammonium sulphide.

4. Oil of peppermint contains, as the oxygenated portion, pip-menthol, $C_{10}H_{20}O$, which is a crystalline solid at ordinary temperatures, and is not precipitated, when in solution, by alcoholic ammonium sulphide.

5. Both oils contain resins, almost free from odour, and formed in part during the process of distillation.

Oil of Sandal Wood. E. M. Holmes. (*Pharm. Journ.*, 3rd series, xvi. 819-822.) The author gives an elaborate account of different kinds of sandal wood and the oils obtained from them, and winds up with the following conclusion:—

It appears that whilst oil of cedar may be recognised by its insolubility in an equal volume of alcohol of specific gravity .920, its admixture with sandal-wood oil to the extent of 10 per cent. cannot be easily detected.

It is quite possible that the higher specific gravity and less solubility of the oil from the India Museum may be due to an admixture of some fixed oil, possibly of sandal-tree-seed oil, which is used for lamp oil in Mysore. This question, however, can only be settled by the distillation of the wood and examination of the oil in India by a competent chemist.

The West Indian oil, as shown in "Pharmacographia," may be detected by its optical properties, and is probably derived from an undescribed *Rutaceous* tree.

The specific gravities obtained indicate that the figure given in the B. P. is too low.

The oil originally recommended for use in medicine by Dr. T. B. Henderson, in the *Medical Times and Gazette* (June 3, 1865, p. 571), was that of *S. album*; var. β *myrtifolium*, the wood of which is said ("Pharmacographia," 2nd edition, p. 602) to be nearly inodorous. But it is only during the last few years that sandal-wood oil has extended its reputation widely. The question arises therefore, Is the therapeutic property of the oil due to true oil of sandal wood, to oil of cedar, or to the oil of the Venezuela tree? The species of the genus *Juniperus* are known to have physiological effects on the urinary organs, and cedar-wood oil may be possessed of as great, or greater, therapeutic value than the sandal-wood oil. Since all these oils are to be met with in commerce, it would be more satisfactory to know which is the most valuable remedy, but this point is one to be determined by the medical profession.

Note on Oil of Sandal Wood. F. H. Alcock. (*Pharm. Journ.* 3rd series, xvi. 923.) The author calls attention to two samples in sandal oil recently examined by him, which differed from others in being highly fluorescent. The action of sulphuric acid on them was the same in both cases, except that the second sample had a redder tint, but around the margin of each there was a salmon tinted ring, which is rarely seen in genuine samples. The specific gravity at 60° F. of No. 1 was '9649, and that of No. 2, '9573.

Concerning the question of gravity, the author has looked through long series of specimens of sandal oil, and does not find more than 20 per cent. of the B. P. standard (0.960), although all were genuine so far as could be ascertained by all known tests. Nearly 50 per cent. were 0.974, while others were 0.9752, 0.9675, 0.964, one only being 0.959. The U. S. P. gravity is a little lower than the official B. P. standard (viz., 0.945). The author does not know how the B. P. came to adopt 0.960.

The Cultivation of the Star Anise Tree, and the Preparation of the Oil in Annam. (*Petit Moniteur de la Pharmacie*, July, 1885.) An interesting report not suited for abstraction. The reader is referred to the above source, or to a translation of the article published in the *Pharmaceutical Journal*, 3rd series, xvi. 91, 92.

Illicium Religiosum. J. F. Eykman. (*Journ. Chem. Soc.*, January, 1886.) The liquid obtained by distilling the leaves and

fruits of *Illicium religiosum* with water consists of eugenol, a terpene to which the author gives the name of "schikimene," and safrole, besides a small quantity of some indefinite compounds of high boiling point, which are probably formed by the polymerization of the previous compounds. Schikimene boils at about 170° , and is a fragrant, limpid, mobile, colourless liquid; its specific gravity = 0.865 ; with concentrated sulphuric acid it yields a magnificent orange colour, and on warming with nitric acid it deflagrates with violence, it also explodes on contact with iodine; its specific rotatory power is $[\alpha]_D = -22.5^{\circ}$, but if heated for some time over metallic sodium, it is reduced to -0.85° . The author finds that by heating safrole gently with an equal quantity of an aqueous solution of potassium permanganate (1 part in 40 of water), piperonic acid is formed; and that from this, and the measurement of the refractive index, he considers that the constitution of safrole is probably best expressed by the formula—



The residue left after the removal of the above compounds by distillation, when subjected to strong pressure, yields a clear syrup, which contains protocathechuic acid, schikimic acid, and schikimipicrin. *Schikimic acid*, $C_7 H_{10} O_5$, which is present in large quantities, is a white crystalline compound, insoluble in alcohol, ether, and chloroform, but readily soluble in water, dilute alcohol, and also in concentrated sulphuric acid. It is not precipitated from its solution by metallic salts, and is not affected by ferric chloride, Fehling's solution, or ammoniacal silver solution; an alkaline solution of auric chloride, however, acts on it readily, oxalic acid being formed. Bromine also acts violently on its aqueous solution. By fusion with potassium hydrate, it appears to yield protocathechuic acid. It is a strong acid, readily decomposing carbonates. It melts at about $178-180^{\circ}$ (uncorr.), and has a specific rotatory power $[\alpha]_D = -200.4^{\circ}$; its salts are difficult to crystallize, being very soluble in water. *Schikimipicrin* forms large transparent crystals, readily soluble in warm water or alcohol, but insoluble in ether, chloroform, and light petroleum; it melts at 200° (uncorr.). Its reaction is neutral, and it has an extremely bitter taste.

Rate of Volatilization of Camphor on Exposure to Air. J. C. Folger. (*Druggists' Circular*, July, 1885.) The author's results are summarised in the following table:—

Mean Temperature.—Fahrenheit Scale.

	73°	80°	83°	82°	78°	61°	63°	71°	66°	73°	Total loss in grains.	Per- cent- age loss.
Original quantities.	Loss at end of 1st week.	Loss at end of 2nd week.	Loss at end of 3rd week.	Loss at end of 4th week.	Loss at end of 5th week.	Loss at end of 6th week.	Loss at end of 7th week.	Loss at end of 8th week.	Loss at end of 9th week.	Loss at end of 10th week.		
	grains.	grains.	grains.	grains.	grains.	grains.	grains.	grains.	grains.	grains.		
4 lb. Bulk Gum	656	825	706	846	686	596	448	487	437	657	6344	22 ³ / ₁₀
4 lb. Pfizer Gum, loose . .	259	327	289	368	397	369	178	279	268	437	3171	11 ⁵ / ₁₀
4 lb. Pfizer Gum, in paper .	437	657	327	588	506	369	236	420	308	348	4196	14 ⁴ / ₁₀
4 oz. Pfizer Gum	115	124	89	122	96	70	90	74	60	58	898	51 ³ / ₁₀
4 oz. Bulk Gum	141	139	68	99	99	75	90	89	60	51	111	52
4 oz. Pfizer, suspended . .	212	241	177	196	153	115	107	109	90	73	1473	81 ¹ / ₁₀
60 grains	16	14	7	7	6 ¹ / ₂	4	2 ¹ / ₂	2 ¹ / ₂	gone.			

The table shows that the loss on exposure is governed by the solidity of the gum, amount of surface exposed, and the condition of the atmosphere. The range of the percentage of the loss in different samples is wide, the lowest being $11\frac{3}{10}$ per cent., and the highest $84\frac{1}{10}$ per cent.; but the fact remains that gum camphor is very volatile, and while exposed, under ordinary circumstances, suffers materially from loss by volatilization.

Test for the Purity of Cod-Liver Oil. J. L. Rössler. (*Zeitschr. für Analyt. Chem.*, xxiv. Part 3, 1885.) Genuine cod-liver oil gives with aqua regia a dark greenish yellow liniment, which becomes brown in half an hour. White seal-oil, and even a mixture of equal parts of the two oils, gives merely a pale yellow liniment.

The Active Principle of Cod-Liver Oil. M. Chapoteaut. (*L'Union Pharmaceutique*, November, 1885, 525, from *Bull. de Thérap.*) The author treats cod-liver oil first with an aqueous solution of carbonate of sodium at a low temperature, to remove the acids, then agitates with alcohol (90°); the alcoholic solution, subjected to distillation, yields morrhuol. Morrhuol has an acrid, bitter taste and strong odour. It contains appreciable quantities of phosphorus, iodine, and bromine, and partly crystallizes at ordinary temperatures. The quantity of morrhuol varies with the quality of the oil employed, the brown oil yielding from 4.50 to 6 in 100, the straw-coloured from 2.5 to 3 in 100, and the bleached oil from 1.5 to 2 in 100. The continued use of morrhuol does not interfere with digestion; on the contrary, producing a very good appetite. Dose—20 centigrams, equivalent to five grams of oil.

The Adulteration of Beeswax. A. Clarency. (*Chemist and Druggist*, December, 1885, from *L'Union Pharmaceutique*.) The author recommends the following process for detecting adulteration in beeswax:—

1. *Density*.—Place a piece about the size of an egg in a beaker containing alcohol, 33° or thereabouts; stir to expel any globules of air adhering to the wax; then add, stirring continually, water or alcohol until a mixture of a density equal to that of the wax shall be attained. This is indicated when the wax, rising to the centre of the liquid column, maintains its equilibrium there. The degree of the alcohol is then taken by means of an alcoholometer, and the density can be calculated from an alcohol table. The test is to be taken at a temperature of 15° .

2. *Boiling the Wax in Water*.—This operation should take place if possible in a flask of 250 c.c. capacity. Take 10 grams

of wax, 100 c.c. of distilled water; boil for a few minutes, stir, and leave to cool. Insoluble mineral substances sink to the bottom of the flask. The liquid should be transparent and colourless; if tinted yellow, the presence of turmeric may be suspected, and discovered with certainty by adding 5 drops of ammonia to 10 c.c. of the liquid, which will assume a deep yellow colour in case of adulteration with turmeric. Farinaceous substances are present if the liquid turns blue on the addition of iodine.

3. *Saponification by Carbonate of Soda*.—Put in a flask of 100 c.c. capacity 2 grams of the suspected sample and 40 c.c. of a cold solution of pure carbonate of soda; boil the mixture slowly for four minutes, then take it off the fire without shaking it, and let it cool. Two different results may occur, viz.:—

(a) The contents of the flask appear in two distinct layers, a solid upper one, about 3 mm. in thickness, and a second layer, limpid, liquid, and of a yellow colour, varying in intensity according to the original colour of the wax. The wax is pure if the density is found to be between 0.961 and 0.963. It is adulterated with paraffin or mineral substances if the density is under 0.960.

(b) The contents of the flask are in a more or less opaque condition, according to the quantity of substances fraudulently added, which may be resin, suet, stearine, stearic acid, or vegetable wax.

No sophistication can escape these three tests.

Supposing beeswax to have been adulterated with a substance of greater density, such as vegetable wax, in order to hide a previous addition of paraffin or mineral wax, the density-test would be of no avail; but the fraud would be demonstrated by the second or third test.

Examination of Honey. H. Hager. (*Chem. Centr.*, 1885, 764-766; *Journ. Chem. Soc.*, 1886, 282.) The author gives the following qualitative tests for the presence of starch-sugar and cane-sugar as adulterants of honey. To detect the former, the honey is diluted with 3 vols. of water and filtered; 4 c.c. are introduced into a small test-tube, 6 drops of a 10 per cent. solution of mercuric nitrate are added, and, after shaking, 4 c.c. of absolute alcohol. On standing at the ordinary temperature, a precipitate gradually forms, if the honey contain a considerable proportion of the sugar; with small proportions, the solution becomes opaque, but no precipitate is formed. More simply, the honey diluted as above is introduced into a test-tube, and absolute alcohol is added so as form an upper stratum; the development of a milky opacity at the line of contact indicates the presence of the sugar. The presence

of cane-sugar is detected by pouring the diluted honey upon concentrated sulphuric acid; at the line of contact browning takes place gradually, and in the course of an hour an opaque black stratum is formed. The reactions with honey free from such adulteration are very different; the observer requires to familiarise himself with these differences by blank experiments.

Evidence of the genuineness of honey is afforded by the presence of pollen grains, which may be easily identified by examination under the microscope. When magnified to from 100 to 200 diameters, the field should present from 5 to 10 of these grains (compare *Pharm. Centr.*, xxvi. 327).

Artificial Honey. Dr. H. Hager. (*Pharm. Centralhalle*, xxvii. 303.) The author warns chemists against American honeys, which are now being adulterated with a syrup manufactured from maize, the method being kept secret. His own experiments show, however, that if wheat or maize-starch (not potato-starch) be treated with oxalic acid, or any other powerful organic acid, a syrup is produced which, in a certain concentration, and after standing two or three weeks, exactly resembles in taste and appearance an old honey.

Constituents of Cochineal. C. Liebermann. (*Ber. der deutsch. chem. Ges.*, xviii. 1969-1983, and xix. 328.) The statements occurring in the text-books as to the composition of cochineal are very incorrect. The author finds that the amount of pure colouring matter present cannot much exceed 9-10 per cent., whilst it is usually stated as forming from 26-50 per cent. of the insect; the statements as to the amount of fat are equally incorrect. A sample of pure carmine was obtained and investigated; when heated at 100°, it lost 17 per cent. of water, but slowly recombined with water, absorbing about 14-15 per cent. on exposure to the atmosphere. It contained 3·7 per cent. of nitrogen, of which only 0·25 per cent. was eliminated as ammonia when boiled with dilute aqueous alkalis. By boiling carmine with dilute sulphuric acid, a small quantity of basic nitrogenous substance was obtained. It has been suggested that the colouring matter of cochineal is a glucoside, but the results obtained negative the assumption. The dried carmine yielded 8·1 per cent. of a white ash.

Silver cochineal is covered with a lustrous layer of white wax, which gives it the appearance to which it owes its name. This wax occurs also in other varieties of cochineal, the difference in appearance being probably due to the less amount of care taken in the preparation. About 2 per cent. of wax occurs on the surface

of the insects, and about half as much again is obtained on finely powdering and again extracting. In addition to this wax, which differs from all previously described, and is termed coccerin, cochineal contains 4-6 per cent. of myristin and 1.5-2 per cent. of liquid fat and fatty acids, which were not further investigated.

Coccerin, $C_{30}H_{60}(C_{31}H_{61}O_3)_2$, is best obtained from cochineal by extraction with boiling benzene; it crystallizes in very thin plates, which collect into a characteristic satiny layer, softens at 101° , and melts at 160° . It is very sparingly soluble in all cold solvents, nearly insoluble in alcohol and ether, even on boiling, but soluble in hot benzene or glacial acetic acid. It is only sponified with difficulty, being converted into cocceryl alcohol and a salt of coccerylic acid. It cannot be distilled unchanged; when heated to above 360° under 20 mm. pressure, it is decomposed into coccerylic acid and an indifferent product (hydrocarbon.)

The author having obtained specimens of the living cochineal insect, is able to show that the peculiar waxy substance termed by him coccerin is really contained in the living animal, and is not produced during the preparation for commerce. The surface of the cactus on which the insects live was covered with what looked like white mould, but on further examination proved to be fragments of coccerin exuded by the insects. Several empty cocoons were examined, and found to contain about three-fourths of their weight of coccerin.

The Fatty Constituent of Cochineal. E. Raimann. (*Monatsh. für Chem.*, vi. 891-898.) When dry cochineal is extracted with ether, and the solution washed with water, a brownish mass is obtained which soon deposits groups of needles. When the fat is saponified, the product washed with ether and acidified, myristic acid, or an isomeride, and two new acids of the acrylic series, $C_{14}H_{26}O_2$ and $C_{12}H_{22}O_2$, are obtained. The ethereal solution yielded two substances, probably alcoholic, $C_{36}H_{72}O$, melting at 66.6° , and $C_{15}H_{26}O$.

When cochineal, after being extracted with ether, is treated with carbon bisulphide, a crystalline substance is obtained identical with Liebermann's coccerin.

Constituents of Cochineal. W. Will and H. Leymann. (*Ber. der deutsch. chem. Ges.*, 1885, 3180-3193.) The authors obtained from 5 kilos of silver-grey cochineal between 400 and 500 grams of pure carmine-red. Dissolved in 50 per cent. acetic acid and boiled with excess of bromine, colourless needles of $C_{10}H_4Br_4O_3$ are obtained, which are insoluble in water, readily soluble in alkalis,

and sparingly soluble in hot alcohol, benzol, or glacial acetic acid. The acetic mother-liquor yields with water yellow amorphous floccules, readily soluble in alcohol, benzol, and ether, and yielding, on boiling with concentrated potash solution, a red pulverulent salt, the acid of which, when liberated, crystallized in yellow glossy needles, having the composition $C_{11}H_5Br_3O_4$, and which has no tinctorial properties; but all its salts are strongly coloured. On treating the alkali solution with stannous chloride, and then supersaturating with hydrochloric acid, ether will extract a substance, the solution of which on exposure to the air acquires [a colour similar to that of a cochineal solution, and like the latter becoming violet-red on the addition of alkali.

The Poisonous Constituent of *Mytilus Edulis*. E. Salkowski. (*Chem. Centr.*, 1886, 24-26.) The mussels were extracted with hot alcohol; an amount of this solution containing 0·0055 of dry substance was sufficient to kill a rabbit. The poison is not precipitated by platinum chloride, is not volatilised by steam, but is decomposed by boiling with sodium carbonate. The poisonous mussels yield a green alcoholic extract, whilst non-poisonous mussels give a nearly colourless extract; hence the poison is probably contained in the liver.

Rhodomycetes, a New Human Vegetable Parasite. Dr. R. von Wettstein. (*Pharm. Journ.*, 3rd series, xvi. 632.) The author describes a fungus found by him in the gastric juice of patients suffering from pyrosis, which he describes as a new species, and places under the name *Rhodomycetes Kochii*. It was always observed outside the organism, but appears to be connected with the saliva, and was found only in certain individuals. It shows itself as a dense, delicate, pink mould, the structure of which is obscured by the enormous quantities of coridia which it produces. Its morphological characters can therefore only be determined by culture. The author considers *Rhodomycetes* to have the closest affinity with several forms of *Oidium*; but it is distinguished by the appearance of the conodiophores, by the mode of formation of the conidia, and especially by its unseptated hyal branches. In habit it resembles *Trichothecium roseum*, and several other moulds.

Semi-Official Descriptions of some New Remedies. (*Pharm. Journ.*, 3rd series, xvi. 879, 880.) The Pharmacopœia Commission of the German Pharmaceutical Association having received a number of new remedies for examination, has published the results in the following paragraphs (*Archiv der Pharmacie*, Feb. 28, 1886, p. 167):—

AMMONIUM SULPHO-ICHTHYOLICUM.

Ichthyol-Sulphonate of Ammonium.

A red-brown, syrupy liquid, with igneous bituminous odour and taste, puffing up considerably and carbonizing when heated, and upon continued incineration volatilizing without residue. Water dissolves it to form a clear, red-brown liquid of faintly acid reaction, and the same is the case of a mixture of equal volumes of alcohol and ether. Pure alcohol or ether dissolves it only partially; petroleum benzine only takes up a small quantity. Upon the addition of hydrochloric acid to the aqueous solution, a dark, resinous mass is precipitated, which, when separated, is soluble in ether and in water, but is again thrown out from the latter solution by hydrochloric acid or sodium chloride. Treated with potash solution, the preparation develops an odour of ammonia, and the mixture dried and burnt yields a hepatic char, which with hydrochloric acid gives off sulphuretted hydrogen.

The ichthyolate of ammonium loses, upon drying in a water-bath, at least half its weight.

ARBUTINUM. *Arbutin.*

Slender, white, shining, crystalline needles, without smell, with a gradually developed, but persistent, bitter taste, melting at 167–168° C., and burning at a higher temperature without residue. It forms neutral solutions with 8 parts of cold water, 1 part of boiling water, and 16 parts of alcohol; in ether it is scarcely soluble. Upon heating 1 part of arbutin with 8 parts of peroxide of manganese, 2 parts of sulphuric acid, and 1 part of water, it gives off the penetrating odour of quinone. The aqueous solution is rendered blue by a small quantity of solution of perchloride of iron, and green by a larger quantity. No precipitate is produced by either acids or alkalies. It blackens ammoniacal silver nitrate solution after boiling with dilute sulphuric acid, and throws down cuprous oxide from alkaline copper solution upon heating. It dissolves in sulphuric acid without colour, turning red after a short time; a trace of nitric acid turns this solution yellow-brown.

An aqueous solution (1 in 20) is not changed by sulphuretted hydrogen.

NATRIUM SULPHO-ICHTHYOLICUM. ICHTHYOLUM.

Ichthyosulphonate of Sodium. Ichthyol.

A brown-black tar-like mass, with a bituminous odour, puffing up when heated, and carbonizing to an alkaline hepatic coal,

which colours the flame intensely yellow, and after continued incineration leaves an ash, an aqueous solution of which, with excess of nitric acid, is at once coloured strongly blue by barium nitrate. Water dissolves the preparation to form a somewhat turbid, dark brown, almost neutral liquid, with a green fluorescence. A mixture of equal parts of alcohol and ether dissolves it with a clear, deep brown colour, as also does benzol, but pure alcohol or pure ether dissolves it only partially, and petroleum benzine scarcely at all. The aqueous solution, treated with hydrochloric acid in excess, throws out a dark, resinous mass, which, after separation, is soluble in ether and in water, but is again separated from the latter by hydrochloric acid or sodium chloride. No ammonia is evolved from the aqueous solution upon warming it with soda solution.

PELLETIERINUM TANNICUM.

Pelletierine Tannate. Punicine Tannate.

A yellowish amorphous powder, without smell, with an astringent taste and faintly acid reaction; soluble in about 700 parts of water, 80 parts of alcohol, and freely in dilute acids upon warming. The aqueous solution is precipitated blue-black by perchloride of iron. If a hydrochloric acid solution be shaken with excess of soda solution and ether, the ether separated leaves, after evaporating spontaneously, slightly yellowish oil-like drops, having a peculiar odour and strongly alkaline reaction, and which form fumes when brought near to hydrochloric acid.

PYRIDINUM. *Pyridine.*

A clear, colourless, volatile liquid, with an igneous odour and burning taste, and, in aqueous solution, an excessively alkaline reaction; boiling at 116–118° C.; miscible clear with water, alcohol, ether, benzine, and fixed oils. Specific gravity, 0.980. Pyridine gives rise to precipitates in solutions of most metals, but not in those of lead acetate and magnesium sulphate. Copper sulphate solution is coloured deep blue by excess of pyridine. Hydrochloric acid solutions of pyridine gives with solution of iodine a brown, with bromine water an orange-yellow, and with platinum chloride a yellow crystalline precipitate.

Pyridine should not be altered by light. An aqueous solution (1 in 10) is not reddened by phenolphthalein; 5 c.c., with two drops of volumetric potassium permanganate solution added, should preserve the red colour at least an hour.

0.79 gram (0.8 c.c.) of pyridine is saturated by 10 c.c. of normal hydrochloric acid.

THALLINUM SULPHURICUM. *Thallin Sulphate.*

A yellowish white crystalline powder, with an odour resembling that of coumarin, and an acid saline, but at the same time bitterish aromatic taste; melting upon being heated, and carbonizing to a heavy but completely combustible coal. It is soluble in 7 parts of cold water, $\frac{1}{2}$ part of boiling water, more difficultly in alcohol, and almost insoluble in ether. The aqueous solution has an acid reaction, turns brown gradually under the influence of light, and gives a brown precipitate with solution of iodine, and a white one with tannic acid; barium nitrate produces a white precipitate insoluble in hydrochloric acid, and caustic alkalies give rise to a white precipitate, that disappears upon shaking with ether. A dilute aqueous solution (1 in 100) is coloured by perchloride of iron deep green, passing after some hours to deep red; fuming nitric acid colours a dilute aqueous solution reddish. Sulphuric acid dissolves thallin sulphate without colour, but upon the addition of nitric acid it becomes deep red, and immediately afterwards yellow-red.

Thallin sulphate should be kept sheltered from light.

THALLINUM TARTARICUM. *Thallin Tartrate.*

A yellowish white crystalline powder, with the smell and taste of thallin sulphate; soluble in 10 parts of water, less freely in alcohol, and scarcely soluble in ether. When heated it melts and carbonizes. The aqueous solution shows the same reactions as that of thallin sulphate, except that it remains unaltered on addition of barium nitrate, and upon the addition of potassium acetate it separates a crystalline precipitate, forming flocks with lime water.

To be kept sheltered from light.

URETHANUM. *Urethane.*

Colourless prismatic crystals, odourless, and having a peculiar cooling taste, melting at 48–50° C., boiling at about 170° C., and subliming undecomposed, or if ignited, burning without residue. Urethane readily forms clear neutral solutions in water, alcohol, ether, and chloroform. In sulphuric acid it dissolves without colour; upon heating, the solution foams and gives off a colourless

and odourless gas. Heated with potash solution ammonia is evolved.

An aqueous solution (1 in 10) does not become turbid on the addition of silver nitrate; 2 volumes mixed with 1 volume of sulphuric acid, and 2 volumes of ferrous sulphate solution run in on the top, should not form a brown intermediary zone.

Ichthyol. Dr. J. Schmidt. (*Therapeutic Gazette*, June 15, 1886.) Ichthyol, or fish-oil, was first prepared by Schröter, and represents the distillation-product of a peculiar bituminous sulphurous mineral obtained from the deposits of fossil fish. According to Baumann and Schotten, ichthyol, or the ichthyosulphate of sodium, has the following composition:—

	Per cent.
Carbon	55·05
Hydrogen	6·06
Sulphur	15·27
Sodium	7·78
Oxygen	15·83
	<hr/> 99·99

Its chemical formula is $C_{26}H_{36}S_3Na_2O_6$.

Ichthyosulphate of sodium is obtained by the action of concentrated sulphuric acid upon the distillation-product of the mineral, and subsequent neutralization with sodium. It presents a tar-like appearance and odour, an alkaline reaction, and the consistency of vaseline. The drug is perfectly soluble in water, partly so in ether or alcohol, but readily soluble again in ether and alcohol combined; with fats and vaseline it can be incorporated in every desired proportion.

Its sulphurous constituents belong partly to the sulpho group, and are partly attached to the carbon. As the sulpho acids exercise themselves little or no action on the animal organism, the therapeutic action of ichthyol must be referred to the sulphur attached to the carbon. Through the introduction of the sulpho group into a sulphur containing oil, the latter is rendered both soluble and resorbable. This feature distinguishes ichthyol from other organic sulphurous compounds previously proposed as therapeutic agents. "Alongside of the considerable percentage of oxygen," says Unna, "the sulphurous constituents of ichthyol represent its essential and active principle."

The extreme solubility of ichthyol enhances the practical value of the remedy.

The following preparations of ichthyol have been (with the exception of the two last) examined and employed by the author:—

1. Ichthyosulphate of sodium, pure or diluted.
2. Ichthyol in an alcohol-etheral solution (5 per cent.)
3. Ichthyol cotton.
4. Ichthyol plaster.
5. Ichthyol soap.
6. Ichthyol vaseline.

The somewhat unpleasant odour and taste of the preparations intended for internal administration can be satisfactorily disguised by the addition of a few drops of alcohol in which equal parts of cumarine and vaniline are dissolved.

The physiological experiments hitherto instituted with ichthyol are too deficient to claim attention, and give no clue to the therapeutic efficacy of the drug.

Preparations of Eucalyptus. J. Bosisto. (*Australasian Journal of Pharmacy*, January, 1886.) The following formulæ are abstracted from an elaborate paper dealing with the history, botany, chemistry, pharmacy, and therapeutics of *Eucalyptus*, published in the journal above named, and reprinted in the *Pharmaceutical Journal*, 3rd series, xvi. 802-805.

Ol. Eucalypti.—Tonic, stimulant, and antiseptic. A small dose promotes appetite. In stronger doses of 10 to 20 minims it first accelerates the pulse, produces pleasant general excitement, and a feeling of buoyancy and strength. Intoxicating in very large doses, but, unlike alcohol or opium, the effects are not followed by torpor, but by general calmness and soothing sleep. A strong cup of coffee will at once remove any unpleasantness arising from an overdose.

In cases of rheumatism, lumbago, sciatica, chronic hepatitis, asthma, bronchitis, and sprains, requiring a strong liniment,—

<i>Ol. Eucalypt.</i>	.	.	.	.	.	.	.	℥iv.
Vaseline	.	.	.	.	.	.	.	℥ij.

Misce.

For throat and other painful affections requiring a mild liniment,—

<i>Ol. Eucalypt.</i>	.	.	.	.	.	.	.	℥ij.
<i>Ol. Olivæ</i>	.	.	.	.	.	.	.	℥j.

Misce.

The addition of *ol. olivæ* prevents irritation of the skin. The vaseline should be warmed before mixing.

For a soothing and steady action : shake well together a tablespoonful of the oil with half a pint of warm water, saturate a cloth with this, and apply over the painful part, repeating if necessary in half an hour.

This oil is a thorough deodorant and disinfectant, and an antiseptic of great power. A few drops sprinkled on a cloth and suspended in a sick room render the air refreshing ; and for disinfecting and deodorizing, a tablespoonful of the oil added to two or three pounds weight of sawdust, well mixed and distributed, will speedily produce a purifying effect.

For internal use : for coughs, asthmatic and throat affections, five-drop doses on loaf-sugar occasionally.

If stronger doses are required, the following may be prescribed :—

<i>Ol. Eucalypt.</i>	. . . . .	ʒj.
<i>Pulv. Gum Acaciæ</i>	. . . . .	ʒiij.
<i>Sacchari</i>	. . . . .	ʒss.
<i>Aq. Cinnamom. ad</i>	. . . . .	ʒiv.

Misce.

Dose—ʒss. for an adult every four or six hours. Or,

<i>Ol. Eucalypt.</i>	. . . . .	ʒj.
<i>Infus. Lini.</i>	. . . . .	ʒiijss.
<i>Syrupi</i>	. . . . .	ʒss.

Misce.

Dose—*Ut supra*.

Anthelmintic : by enema, 30 to 60 minims of the oil in mucilage of starch.

Succus Eucalypti Globuli Laminæ.—Tonic, antiperiodic, and antiseptic. An important remedial agent in intermittent and remittent fevers ; also successfully employed in affections of the respiratory organs—bronchitis, asthma, emphysema, whooping cough—relieving fits of coughing, and allaying the irritation of the bronchi by promoting expectoration. Completely soluble in water. Dose—ʒj., with the addition of a little syrup. Employed also in purulent catarrhal affections of the urethra and vagina in dilution ; and as an antiseptic in dressing wounds.

Succus Eucalypti Rostrate.—The inspissated juice of the red gum tree of Victoria ; possesses a delicate mucilaginous astringence, and is a safer and more effective remedy than either kino

or catechu. Dose—Adult, one fluid drachm; generally in combination with conf. arom.

Syrupus Rostratæ.—Prepared from the inspissated juice of the red gum tree of Victoria.—A delicate mucilaginous astringent with tonic properties. Employed in affections of the mucous membrane of the stomach and bowels, and in the treatment of chronic dysentery and diarrhœa. As a topical astringent in relaxation of the uvula and tonsils, either in the form of a gargle, syrup, or lozenge. Soluble in alcohol, cold or boiling water. Incompatibles—The alkalies and the metallic salts.

Eucalyptol, $C_{12}H_{20}O$. (Vapour density, 6·22).—From *Eucalyptus Globulus*.—This volatile body is a homologue of camphor, and appears to be two steps higher in the series. Its vapour, mixed with air, is agreeable when inhaled, and is employed as a therapeutic agent in bronchial and diphtheritic affections. Quantity employed—From half to one teaspoonful, with half a pint of hot water in the inhaler.

For internal use: may be employed in the same manner and for similar purposes as the ol. eucalypti, but is more volatile. Dose—Five to ten minims.

Eucalyptene.—From *Eucalyptus Globulus*.—The tonic or bitter principle in an amorphous condition; employed in low fevers, in doses of 1 to 3 grains in pill form.

Liquor Eucalypti Globuli.—Remedy for ague, intermittent and remittent fevers.—Dose for ague and dengue fever—30 to 60 minims in half a wineglassful of water every two or three hours during the paroxysms of ague. As a general tonic—20 to 30 minims in wine or water three times a day. Incompatibles—The mineral salts.

Ung. Eucalypti Viridis.—Antiseptic emollient; rapidly sets up a healthy action.

Helenin as a Remedy in Diphtheria. Dr. J. B. Obiol. (*Lancet*, April 10, 1886.) Helenin is recommended by the author as a local application in diphtheria. When pure, it should be perfectly white and flocculent, like sulphate of quinine, with aromatic odour and bitter aromatic taste; insoluble in water (to which it should impart no opalescence); very soluble in alcohol, and especially soluble in ether, the solutions being clear, colourless, and without sediment. It is soluble in oil of sweet almonds to the extent of two per cent. Impure specimens are apt to be granular, heavy, yellowish, only slightly bitter, with resinous odour, and they sometimes render water opalescent and deposit a precipitate

from solutions in alcohol or ether. Another substance sometimes sold for helenin, said to be a derivative of shalin, and not possessed of the antiseptic properties of helenin, is crystalline; only slightly soluble in alcohol or ether, and not at all in oil of sweet almonds.

The author first applies powdered camphor with the end of a finger to the diphtheritic process, and then paints the surface with a solution of helenin in almond oil. This is at first repeated every four hours, and quickly destroys the false membrane. It can be given internally in doses of $1\frac{1}{2}$ grains to children six years of age. The remedy sometimes causes constipation.

Antiseptic Properties of Caramel. M. Convert. (*Pharm. Rundschau*, August, 1885, 175.) The author states that pure caramel has proved to be a very prompt remedy against catarrhal affections of the bowels, without any accompanying detrimental action, whilst the slightly aromatic bitter taste makes it acceptable. In its preparation he recommends that white sugar should be heated slowly in an iron pan up to 200°C ., with constant stirring, until the mass takes a brown-black colour and a drop placed on a cold plate becomes hard directly. Half its weight of warm water is then slowly poured upon the mass, and heated until the caramel is completely dissolved. Some judgment is required as to the heating of the sugar, since, if it be discontinued too soon, a longer boiling is required to effect a complete solution of the caramel, which imparts to it a bitter flavour. Without the addition of water the product forms a black extract-like, very hygroscopic mass, which may be quickly rubbed down and preserved as a powder in small flasks. The dose recommended is from two to four grams.

Iodol, a New Antiseptic. (From *Pharm. Post*.) Iodol is one of the constituents of animal oil (the distillate obtained by subjecting animal substances containing protein bodies to destructive distillation, is pyrrol.) When this oil is freed from other bodies as much as possible, and then precipitated by iodide of potassium, an iodine substitution-product is obtained, namely, tetra-iodo-pyrrol, which has been called for short "iodol" by the discoverers, Drs. Silber and Ciamician, of Rome. According to experiments made by Dr. Mazzoni, of Rome, iodol is a powerful *antiseptic*, having an anæsthetic action and greatly promoting the granulation of wounds. It has this advantage over iodoform, that it is free from the penetrating odour of the latter, and does not produce any symptoms of intoxication.

Iodol is a brownish crystalline powder, which may be warmed

to 100° C. without decomposition. At a higher temperature it evolves vapours of iodine, and finally leaves a voluminous charcoal. It is almost insoluble in water, but easily soluble in ether, chloroform, and alcohol, and especially so in absolute alcohol. Its alcoholic solution is precipitated by water, but not by glycerin. Sulphuric acid dissolves it with a green colour, and when the alcoholic solution is warmed with nitric acid, it becomes bright red.

Iodol contains nearly 90 per cent. of iodine.

Kava as a Local Anæsthetic. Dr. Lewin. (*Deutsche Medicinal-Zeitung*, February 1, 1886.) The author reports the results of additional personal experiments with this new narcotic, the anæsthetic properties of which are singularly like those of cocaine. He found that six or seven minims of a solution of kava, injected beneath the skin, produced complete loss of sensibility in the surrounding area, which did not pass off for five days. The anæsthesia was so extreme that even strong induced currents failed to produce more than a slight prickling sensation. When a small quantity of the resin was placed on the tip of the tongue, the bitterest drug could not be tasted.

Piper Methysticum, a New Local Anæsthetic. Dr. Lewin. (*Medical News*, February 13, 1886.) At a recent meeting of the Medical Society of Berlin, the author presented an interesting series of observations upon the physiological effects of a resinous extract obtained from the root of *Piper methysticum*, which is soluble in alcohol, possesses a somewhat aromatic taste, and leaves upon the tongue a sensation of pricking and burning, soon lost in the supervening local insensibility. When the extract, even in very small amount, is instilled into the eye of an animal, a slight local irritation is evidenced by repeated blinking, which soon yields to a marked, enduring, and complete insensibility of the conjunctiva and cornea. In guinea-pigs the author has seen this insensibility continue for more than an hour, normal sensation gradually returning. The iris retains throughout its reflex responsiveness to optic stimuli. No anatomical lesions of the cornea or conjunctiva were observed as the result of its application.

When the solution of the extract is injected hypodermically, the tissues with which it comes in contact completely cease to respond to the application of thermic, electric, and chemical stimuli—a transitory condition which is followed by no symptoms of inflammation.

In regard to the constitutional effects produced by the drug

upon man, much the same claims are put forward as in the case of coca. When used in moderate amounts, a feeling of comfort, contentment, and rest, with complete retention of consciousness and reason, is said to result. With large doses there is a sensation of dreamy happiness, with an intense desire for sleep; while in excess the infusion causes nausea, headache, paresis of the extremities, nervous trembling, and somnolence. The general effect upon birds, rabbits, and cats is analogous to that produced in man.

It is evident that the drug is of considerable importance, and, if further experience shows that it effects in man the prolonged anæsthesia that it induces in animals, it will be of great utility in very many operations in minor surgery.

The Physiological Action of Benzoyl-Ecgonine. R. Stockman. (*Pharm. Journ.*, 3rd series, xvi. 897, 898.) When $\frac{1}{10}$ to $\frac{1}{8}$ grain is administered subcutaneously to a frog, the animal remains apparently unaffected for half an hour or more, at the end of which time it begins to develop signs of muscular stiffness, and shows great unwillingness to move. The pupil gradually becomes dilated. In eighteen to twenty-four hours after administration, the reflexes become slightly exaggerated, this increasing until the slightest irritation brings on a tetanic spasm. This condition may last one or several days, and the frog ultimately recovers or dies of exhaustion. Such, briefly stated, are the effects of a medium dose, the same train of symptoms being manifested in a greater or less degree with larger or smaller amounts.

Division of the spinal cord at the medulla had no effect in stopping the convulsions after they were once established.

Action on the Heart.—With moderate doses the rapidity of the heart's action was increased, while larger doses, after inducing great irregularity of action, caused it to stop in diastole.

No effect on the vessels of the web could be observed.

Nervous System.—The spinal cord, as before indicated, is thrown into a state of great reflex excitability, exactly similar to what occurs in strychnine poisoning.

The sensory and motor nerves remain quite unaffected.

Striped Muscle.—It acts as a muscle poison apparently similar to caffeine, but not nearly so active.

On mammalia the author had not sufficient material to carry out a satisfactory number of experiments. A rabbit which received 24 grains subcutaneously remained apparently little affected.

Cats were more susceptible. On administering 24 grains sub-

cutaneously, the animal shortly after became very uneasy, and was seized with diarrhœa and vomiting, while the pupils were very dilated. Half an hour after, a violent tetanic spasm supervened. During the next few hours the animal had almost continuous convulsions, and finally died of exhaustion. The heart was in diastole, and the small intestine so firmly contracted as almost to occlude the lumen.

From the foregoing description, it is evident that benzoyl-ecgonine is practically identical with caffeine in its action, although there are some minor points of difference.

The chief action of cocaine—namely, paralysis of sensory nerves—is quite absent; in fact, the relationship between the action of the two substances seems to be as profoundly altered by the subtraction of a methyl-group ($C H_3$), as is the case with methyl-strychnine and strychnine.

The Physiological Action of Kairine, Thalline, Hydrochinone, Resorcin, and Antipyrin. Dr. H. G. Beyer. (*Amer. Journ. Med. Sciences*, April, 1886, 369-402.) The author's experiments show that kairine reduces temperature, both by diminishing heat production and by increasing heat radiation. The distinctive influence it exerts on the red blood-corpuscles, however, and the weakening effect upon the heart, render its employment objectionable and dangerous.

Thalline, like kairine, reduces temperature by diminishing heat production and by increasing heat radiation; as an antipyretic it is less dangerous, but no less objectionable than kairine, for while its effect upon the ventricle of the heart is less depressing than that of kairine, its influence upon the blood-corpuscles is sufficient to condemn it.

The action of hydrochinone is similar to that of kairine and thalline. Resorcin reduces the temperature by increasing heat radiation by the dilatation it produces in the capillaries and veins, especially the latter.

Antipyrin reduces temperature purely by increasing heat radiation, owing to its extensively dilating the veins and capillaries: but what stamps it as an excellent antipyretic is that, besides dilating the veins, it also has a tonic influence on the heart, and slightly increases arterial pressure, or, at any rate, does not cause a diminution of the same. It has, moreover, no injurious influence on the blood or the muscular tissues, and strengthens the auricles.

The objection to the employment of kairine and thalline as antipyretics arises from the fact that they cause heart paralysis,

especially affecting the auricles, in doses only slightly larger than are sufficient to produce a lowering of the temperature. But this objection becomes an absolute danger in view of the destructive influence upon the blood-corpuscles and tissues generally.

Hydrochinone and resorcin, although not exerting the same weakening and directly paralysing influence upon the ventricle of the heart which is peculiar to kairine and thalline, both paralyse the venous side of the heart, viz. the auricles, and greatly lower the tone of the walls of the veins. The extra amount of blood, therefore, which is driven into the veins through the increased action of the ventricle, is only with great difficulty returned to the ventricle, and here the danger is not so much from failure in the power of the ventricle, as in the case of kairine and thalline, as from the danger of *bleeding the animal to death in its own veins*. The intense visceral, and especially pulmonary congestion found in post-mortem examinations by Dujardin-Beaumetz and others in animals killed by resorcin, seems to confirm this view of the matter.

Antipyrine, though largely dilating the veins, increases the power of contraction of both auricles and ventricle, and has no injurious influence upon the blood nor the muscular tissues, and therefore possesses indeed all the good qualities of a perfect antipyretic.

Antipyrin. (*Amer. Journ. of Pharm.*, 1886, 114.) Antipyrin resembles sodium salicylate in its action, and is recommended by Dr. Neumann (*Berl. Klin. Woch.*) for further trial in chronic rheumatism of the joints and in rheumatic neuralgia. Dr. A. Walker (*Brit. Med. Journ.*, Nov. 7, 1885) has observed it, in two cases of typhoid fever, to produce reduction of temperature to about normal, and good refreshing sleep for five or six hours; 15 grains of the remedy were given at nine p.m., and $7\frac{1}{2}$ grains each at ten and at eleven p.m. Antipyrin was also found useful to produce sleep in several cases of pyrexia in young children. Teaspoonful doses three times a day of the following mixture have been used by Dr. Dumolard in typhoid fever:—Antipyrin, 20, Jamaica rum, 30, water 150, and syrup, 150 grams.

Incompatibility of Antipyrin and Spirit of Nitrous Ether. M. Eules. (*Pharmaceutische Rundschau*, xxii. 70.) According to the author, sweet spirit of nitre and antipyrin are incompatible, owing to the formation of an aniline.

Acetophenone, or Hypnone: a New Hypnotic Agent. S. Limousin. (*Archives de Pharmacie*, i. 1; from *Pharm. Journ.*, 3rd series, xvi. 582.) Dr. Dujardin-Beaumetz has recently sub-

mitted to the Académie de Médecine and the Société de Thérapeutique the results of his clinical experiments upon the hypnotic properties that he has discovered in acetophenone, methylphenylacetone, or methylbenzoyl. He proposes to confer on this new remedy the name "hypnone," as being more easily remembered, and at the same time recalling its hypnotic properties.

The compound belongs to the aromatic series, and has for its formula $C_6H_5 \cdot CO \cdot CH_3$. It has been obtained by Friedel by causing chloride of benzoyl to react upon zinc methyl, or by distilling a mixture of benzoate and acetate of calcium.

Acetophenone is a colourless, mobile, very refractive liquid, boiling at $198^\circ C$. It is volatile, and its odour is tenacious and very persistent, recalling at the same time oil of bitter almonds and cherry laurel water. It is not inflammable, but it intensifies the combustion of substances impregnated with it. At about 4° or $5^\circ C$. it becomes solid, and forms a mass of large interlacing crystals. Its density differs little from that of water, a cubic centimetre weighing 1.06 gram. It is not soluble in water or in glycerin. The difference between the density of acetophenone and that of water is so slight that it remains in suspension in that liquid in the form of globules for some time before reaching the bottom of the vessel. It is neutral in reaction to litmus paper.

Acetophenone is very soluble in alcohol, ether, chloroform, and benzine. The author has ascertained also its great solubility in oils, and particularly in oil of sweet almonds, which has suggested to him the idea of inclosing it in capsules after dissolving it in that menstruum.

With a *compte-gouttes* titrated according to the indications of Lebaigue, acetophenone gives thirty-nine or forty drops to the cubic centimeter, which is nearly double the number of drops obtained with a cubic centimeter of water; each drop therefore weighs about $2\frac{1}{2}$ centigrams.

The liquid produces upon paper a rather persistent oily spot. Brought into contact in the cold with sulphuric acid, hydrochloric acid, or perchloride of iron, it gives rise to no reaction or characteristic coloration. With nitric acid there is a production of a yellowish colour. It dissolves bromine and iodine in large proportions, with considerable development of heat, especially in the case of bromine.

Dr. Dujardin-Beaumetz was the first to demonstrate the hypnotic properties of acetophenone, which had escaped the observation of Popoff, who after Friedel was occupied with

the study of this compound. The dose in which he has administered it to his patients has varied from 1 to 16 drops, and this dose always induces, according to him, four to six hours of refreshing sleep. The quantity should be administered in a single dose to obtain a well-marked hypnotic effect, and it should be proportioned to the age and temperament of the patient. When injected subcutaneously, in the pure state, into guinea-pigs, in a dose of from 50 centigrams to 1 gram, it brought on a kind of comatose somnolence, followed by the death of the animal five to six hours after the injection.

Dr. Constantin Paul and Dr. Huchard have also experimented with this medicament in their hospital practice, and they have arrived at conclusions very similar to those of Dr. Dujardin-Beaumetz.

In the first experiments, Dr. Dujardin-Beaumetz administered the acetophenone diluted with alcohol, ether, or glycerin and inclosed in capsules.

M. Vigier has proposed to administer acetophenone under the form of a syrup, prepared according to the following formula:—

Hypnone	1 drop.
Alcohol (60°)	1 gram.
Syrup of Orange-flowers	6 grams.

A teaspoonful would correspond to one drop.

M. Vigier has also suggested the form of an elixir:—

Hypnone	1 drop.
Alcohol (90°)	3 grams.
Syrup of Peppermint	3 „

M. Petit has also proposed certain analogous formulæ, into which he introduces glycerin; but this, in the author's opinion, is useless, since acetophenone is as insoluble in glycerine as in pure water.

Lastly, Dr. Constantin Paul administered it in a mixture as follows:—

Hypnone	4 drops.
Glycerin	2 grams.
Looch Blanc (Codex)	50 „

In this preparation the acetophenone remains mixed with the looch; this is probably due to the oil contained in the almonds, and not to the glycerin, which would with advantage be replaced by 2 grams of oil of sweet almonds.

The author recommends the employment of gelatin capsules, each containing two drops of hypnone and a few drops of oil of sweet almonds, for the administration of this remedy.

Urethane: a New Hypnotic. Dr. v. Jaksech. (*Pharm. Post*, August 15, 1885, 905; *Pharm. Journ.*, 3rd series, xvi. 187.) Urethane is the name of a new synthetically prepared hypnotic, which is reported by the author to have proved prompt in its action, and unaccompanied by any disadvantageous subsidiary action. It is described as the ethyl ether of carbaminic acid ($\text{N H}_2 \cdot \text{C O}_2 \cdot \text{C}_2 \text{H}_5$), and as forming white crystals freely soluble in water, inodorous, and having a not unpleasant taste, recalling that of nitre. So far as the experiments went, it was found that the dose ordinarily necessary to induce sleep was 0.5 gram. This was given at seven o'clock; in cases of necessity it was repeated at nine o'clock, and in some cases a third dose was given at midnight.

Scopoline as a Mydriatic. P. d'Houy. (*Therapeutic Gazette*, from *La France Medicale*.) According to the author, scopoline, an alkaloid existing in *Scopolia Japonica*, dilates the pupils more rapidly than atropine. Its action is not only very energetic, but it lasts longer. On the third day, after scopoline has been instilled, the pupils are more dilated than after the instillation of atropine. It appears to have no irritative effects on the conjunctiva, and is a strong antagonist to the action of eserine.

Paraldehyde as an Antidote to Strychnine. Prof. Bokai. (*Chemist and Druggist*, from *Chemiker Zeitung*.) The author has found paraldehyde to be an excellent antidote to strychnine, rabbits having been found to bear with immunity ten times the lethal dose of strychnine when the poison had been previously mixed with paraldehyde.

Chloraldehyde has often been used in cases of poisoning with strychnine, but this substance acts injuriously on the heart, which paraldehyde does not. In cases of human poisoning, the author recommends a dose of from 6 to 10 grams of paraldehyde twice daily, until prolonged sleep sets in; but at present no case has occurred admitting of experiment. He further suggests the use of paraldehyde as an antidote to brucine, thebaine, and picrotoxine. Simultaneously with the author, Ceruello and Dujardin-Beaumetz have likewise claimed the recognition of paraldehyde as an antidote to strychnine.

The Physiological Properties of Sparteine. G. Séc. (*Comptes Rendus*, ci. 1046-1048.) Sparteine sulphate, administered in

solution, strengthens the action of the heart and the pulse, and in this respect is equal to digitaline or convallamarine, whilst its tonic action is infinitely greater, more rapid, and more durable. It immediately regulates any disorder of the cardiac rhythm, and in this respect is far superior to any known medicine, and it resembles belladonna in accelerating the heart's action. These effects are produced in an hour, or at latest in a few hours, after the administration of the drug, and persist for three or four days after administration has ceased.

Physiological Action of Hydrastine. Dr. T. J. Mays. (*Therapeutic Gazette*, 1886, 290.) Hydrastine, obtained from the rhizome of *Hydrastis canadensis*, has been investigated by the author with regard to its physiological action. It appears from the results of his experiments that this principle is a valuable remedy in hyperæmia or catarrhal condition of the mucous membranes, since it powerfully contracts the capillary vessels. It also acts as a tonic to the spinal nervous system. The author used chiefly Merck's hydrochlorate of hydrastine.

Physiological Action of Boric Acid and Borax. M. Johnson. (*Journ. de Pharm.* [5], xiii. 267-269; *Journ. Chem. Soc.*, 1886, 572.) The dose of boric acid varied from 0.9 gram to 3.6 grams per day; that of borax was 1.5 gram per day. The action in both cases was not very sensible, excepting sometimes a considerable diuretic increase. With a dose of 3.6 grams, however, intoxication followed. The boron quickly makes its appearance in the urine, and may be detected from eight to fifteen days after its employment. The presence of boron in the excrement was very irregular. Three observations showed faint traces in the saliva. Boric acid applied to the skin in an ointment quickly appeared in the urine.

Santonin as an Emmenagogue. W. Whitehead. (*Lancet*, September 5, 1885.) Santonin, hitherto only known as an anthelmintic, is now shown by the author to possess other valuable properties. He employed it at first in a case of chloro-anæmia, and has subsequently given it in numerous cases of amenorrhœa with almost invariable success.

Solution of Caffeine for Hypodermic Use. C. Tanret. (*Répertoire de Pharm.*, March, 1886, 119.) Owing to the insolubility of caffeine, pharmacists are sometimes perplexed when making a solution for hypodermic use. The author recommends the following:—R Sodii benzoatis, 2.95; caffeini, 2.50; aquæ dest., 10 c.c. Mix the benzoate of sodium and caffeine in a mortar, and add the water; filter. Benzoate of sodium is preferable to the salicylate.

If any trace of iron is present, salicylate of sodium would form a rose-coloured solution.

Poisoning by Nitrate of Potash. Dr. H. D. Littlejohn. (*Pharm. Journ.*, 3rd series, xvi. 428.) The author relates a case in which the consumption of a large quantity of nitrate of potash by a boy was attended with fatal results.

Copper Compounds as Poisons. Du Moulin. (*Journ. de Pharm.* [5], xiii. 189, 190.) Copper sulphate to the amount of 3, 4, and 5 grams at a time was given to dogs; vomiting followed, but after some hours the animals appeared none the worse. Doses of $\frac{1}{2}$ –1 gram of copper subacetate were given every day for six weeks to dogs and rabbits, without producing poisonous effects. Vomiting occurred during the first four or five days, after which it ceased, and did not again recur. Oxide and carbonate have been administered during a year to rabbits without hindering growth. Compounds of copper with fatty acids gave similar negative results. The author has prescribed copper sulphate in various cases of infantile sickness, without producing poisonous effects.

Mercury Compounds in the Animal Organism. Dr. R. Fleischer. (*Deutsche Med. Wochens.*, September 3, 1885; *Med. Chron.*, December, 1885, 229.) The author, in a study of the modification undergone by preparations of mercury in the animal economy, adduces the following facts as the result of his experiments:—(1) Calomel, which in pure water is insoluble, in the presence of chloride of sodium is dissolved and transformed into the bichloride of mercury. (2) The formation of mercuric chloride is favoured by a high temperature, *i.e.* the temperature of the body. (3) The amount of mercuric chloride produced is minute, but plainly recognisable. (4) Dilute hydrochloric acid of a strength of 25 per cent. converts only a minimum portion of calomel into the bichloride. A solution of a strength of 4 per cent. is much more active. (5) By mixture of potassium iodide and calomel, iodide of mercury is produced. The double salt produced is soluble in excess of potassium iodide, but separates in pure water into the insoluble oxide of mercury and into iodide of potassium. (6) The oxide of mercury forms, with chloride of sodium, corrosive sublimate and caustic soda.

Report on Two Commercial Samples of Papain. E. J. Eastes. (*Pharm. Journ.*, 3rd series, xvi. 45, 46.) The two commercial samples of papain reported on by the author were very different in appearance.

A was a white, amorphous, non-hygroscopic, nearly odourless

powder, which dissolved almost entirely in water, forming a slightly turbid solution which kept sweet for many days.

B was a coarse brown powder with a rather strong smell. It partially dissolved in water, giving a brown solution, and leaving a large proportion of insoluble, slightly gritty residue. The aqueous solution had a peculiar smell, which increased from day to day.

Comparative experiments were performed on fibrin, albumen, and milk with each sample of papain; the following results being in most cases the means of several experiments.

Moist Fibrin.—8 grams of raw lean beef were digested with 0.1 gram of papain at 98° Fahr. for three days; 75 per cent. of the meat was found to be soluble in water only at the same temperature. The residue obtained from the portion to which papain *A* had been added weighed 1 gram, showing that *A* had dissolved 400 times its weight of raw meat, equal to 100 times its weight of the insoluble portion. It was found that *B* had dissolved only 100 times its weight of the raw meat.

Pure Dry Fibrin.—The action of either papain was very slight indeed, due to the age and hardness of the fibrin used. The most that could be dissolved in two days was only about two or three times the weight of the papain employed.

Cooked Fibrin.—Cooked (roasted) meat in a state of fine division was digested with 1 per cent. of papain at 98° F. After some hours the insoluble portion was removed, well rubbed down in a mortar, and returned to the liquid. After altogether thirty hours digestion, the residue was washed, dried, and weighed. The other portions of the same sample of meat were treated in exactly the same way, but with the addition of a small quantity of hydrochloric acid. These formed more gelatinous-looking solutions, and the undissolved portion was more bulky and more difficult to wash than those which had not been acidified, but the actual quantity of matter dissolved was in both cases practically the same. Check experiments were performed in each case with water only, to ascertain what proportion of the meat was soluble in that menstruum. The results were as follows:—*A* had dissolved 60 times and *B* nearly 20 times its own weight of cooked meat. The solutions gave no precipitate on boiling, nor with nitric acid.

Hard Boiled Albumen.—15 grams of hard boiled white of egg were digested with .075 gram of *A* at 98° F. After three hours it was rubbed in a mortar to break down the pieces of albumen, and again digested for a few hours. The whole ultimately formed a uniform emulsified-looking fluid, with the exception of a very

small residue at the bottom. After standing some hours, the supernatant fluid was poured off, and the residue was washed and weighed. The weight was very trifling, something under .2 gram, so the papain had practically dissolved nearly 200 times its weight of hard boiled albumen.

An exactly similar experiment was performed, using papain *B*. The albumen after a few hours, when rubbed in a mortar, did not break up to anything like the same extent as that to which *A* had been added, and there was a considerable portion left undissolved at the close of the digestion. This on being washed, dried, and weighed (the amount of moisture present in the original albumen having been previously ascertained), showed that *B* had dissolved 62 times its weight of moist albumen.

Milk.—100 c.c. of milk was digested with .1 gram of *A*, and another 100 c.c. with .1 gram of *B*. In about three minutes the first had formed a curd, which immediately commenced to dissolve, and in twenty-four hours most of it had disappeared. The milk to which *B* had been added was watched for seven hours, up to the end of which time it had not curdled. On being revisited, twelve hours later, it was found that a curd had formed, probably from natural causes; but after leaving it seven or eight hours longer, the curd still showed no signs of dissolving, whilst *A* in the same time had dissolved nearly the whole of the curd produced.

Contribution to the Knowledge of Pepsin. C. Sundberg. (*Zeitschr. für Physiol. Chem.*, 1885, 319; *Amer. Drugg.*, 1885, 148.) The author has prepared *pure* pepsin, free from albumen, by destroying the “rennet-ferment” by means of heating to 40° C. (104° F.), during which operation any albumen still present is also converted into “pepsin.” The pepsin solution thus obtained is mixed with calcium chloride and sodium phosphate, then neutralized with very dilute ammonia, and this operation repeated several times, until a precipitate is no longer produced. This precipitate, consisting of calcium phosphate and pepsin, is washed with water, dissolved in the smallest possible quantity of 5 per cent. hydrochloric acid, and then dialyzed until the contaminating salts are removed. The clear, colourless solution finally obtained excels the original solution in digestive power.

When treated qualitatively with reagents for albumen, the solution gave negative results.

The only agent which precipitated the pepsin was absolute alcohol, which did not, however, diminish its digestive power, except when allowed to be in contact with it for a long time, in

which case it became insoluble and inert. These results render it very probable that pepsin is a modification of albumen.

Preparation and Properties of Peptone. (*Schweiz. Wochenschrift*, xxiii. 381.) 5 kilograms of finely-chopped, lean beef are placed in a porcelain evaporating dish with 5 kilograms of water, 150 grams C. P. concentrated hydrochloric acid, and 20 grams (Witte's) pepsin; allowed to stand at ordinary temperature for one day, stirring frequently; it is then heated in a water-bath, taking care not to heat the mixture to more than 70° C. for one day. The excess of acid is neutralized by sodium carbonate (requiring about 150–160 grams). The resulting turbid solution is brought up to 10 kilograms, 5 kilograms of concentrated alcohol added, and then put aside for one day to settle. The precipitate is collected on a strainer, expressed, and the liquid filtered. After recovering the alcohol, the solution is evaporated to extract consistency, poured on plates, and dried. Peptone prepared thus is in brown pieces, quite brittle, yielding when pulverized a yellowish brown powder, soluble in at least 2 parts of water. Yield is about 4–6 per cent. of the meat used.

Properties: (1) Peptone should be soluble in 2 parts of water; the solution is not gelatinous, and becomes turbid on adding 5 volumes of absolute alcohol; the addition of more water makes a clear solution. (2) A 10 per cent. solution does not become turbid either at an ordinary or elevated temperature on adding nitric acid, acetic acid, ferrocyanide of potassium, or saturated solution of sodium sulphate. (3) Picric acid produces yellow, tannic acid ash-grey, flakes. (4) Sulphate of copper and caustic potash produce a violet coloration. (5) It should yield not more than 2 per cent. of ash when incinerated. (6) If to 20 drops of a 1 per cent. solution of peptone, 5 drops of a 10 per cent. solution of calcium bichromate are added, no turbidity is produced; if the mixture becomes turbid, it proves the presence of at least 5 per cent. of glutinous matter. Solution of bichromate of calcium (Freire's test) is made by dissolving 5 grams crystallized chromic acid in 25 grams of water, gradually adding 2 grams pure calcium carbonate; after effervescence, the solution is diluted to 60 c.c., and filtered through glass-wool. Owing to the rapidity with which peptone is decomposed, it is not advisable to keep it in liquid form.

Determination of the Diastatic Value of Malt Extracts. J. R. Duggan. (*Amer. Journ. Pharm.*, 1886, 9211.) The following method is suggested for the determination of the diastatic value of malt extracts:—

A 3 per cent. starch paste is made by adding a weighed quantity of Bermuda arrowroot to distilled water, and heating the mixture to gelatinization in the water-bath. A flask containing 250 c.c. of this paste is placed in a water-bath kept at 55° C., and when it has attained a constant temperature, 5 c.c. of a 5 per cent. solution of the extract in distilled water is run in, and the whole mixed by shaking. At the end of half an hour the reaction is stopped by the addition of two or three c.c. of a 10 per cent. solution of caustic soda, and the whole diluted to 500 c.c. The sugar present is determined by Fehling's solution, and this, minus the quantity contained in the extract used, is the amount formed by diastatic action. If this should be greater than one-third the starch used, another experiment should be made with a smaller quantity of extract. The sugar should be calculated as maltose (reducing power = $\frac{2}{3}$ glucose), since this is the only sugar formed in the reaction.

A Protest against Evaporation in the Manufacture of Fluid Extracts, etc. Dr. W. I. Clark. (*Pharm. Journ.*, 3rd series, xvi. 521.) The author condemns the practice of evaporation in the manufacture of fluid extracts and similar preparations. He selects *extractum ergotæ liquidum*, *extractum cinchonæ liquidum*, and *syrupus senneæ* as typical instances, showing that by a careful system of percolation and re-percolation, superior preparations are obtained without recourse to evaporation. The details given are very interesting; but since they would suffer in value by condensation, we strongly invite the reader's attention to the original article.

A Modified Extraction Apparatus. W. H. Ince. (*Pharm. Journ.*, 3rd series, xvi. 683.) Having had occasion to use an upright extractor for liquids of high boiling points, as amylic alcohol, the author found that most forms of apparatus were inapplicable; their intricate construction, or their condensation surface, necessitated the employment of much heat.

To obviate this difficulty he constructed the following apparatus, by means of which the vapour is conveyed through the centre of the substance to be exhausted.

The outer vessel consists of a wide tube drawn out at one end; the inner one is an ordinary piece of narrow glass tubing, having two flanges made by slightly pressing the tube when heated by a pair of crucible tongs. On these flanges the inner tube rests.

The condensing tube, surmounting the apparatus, has a small blown glass funnel or thistle fused or otherwise attached.

It may be also constructed by making an indentation at the

drawn-out end of the outer tube, and enlarging the inner tube near the base by a bulb, so that the bulb rests on the constricted portion of the outer tube.

The funnel or thistle at the base of the upright condenser may be replaced by a cap placed on the top of the inner tube made of a short test tube, having its sides slightly indented to allow free passage of the vapour.

To charge the apparatus, the inner tube is placed so that the enlarged portion rests on the indentation of the outer tube; a plug of cotton wool is then placed all round it, and the powdered drug poured in, care being taken that the inner tube be kept perfectly upright, and that nothing be allowed to drop down it. A small plug of cotton-wool temporarily placed at the mouth of the inner tube will facilitate the charging of the apparatus.

The advantages are threefold: first, there is economy of heat, as the powdered drug acts as a steam jacket, and allows the vapour to rise freely; secondly, the condensed liquid is impartially dropped by means of a funnel on the substance to be extracted, continuous dropping on one spot being avoided; and lastly, the construction is simple, and therefore the extractor is inexpensive and not liable to break.

The disadvantage of the apparatus is that it is more difficult to charge than extractors of somewhat similar nature.

Preservation of Extracts. C. J. Davey. (From *The Lancet*.) Most practitioners must have experienced the difficulty of keeping the extracts of the Pharmacopœia at their proper consistence for pill making and other purposes. This drawback may be obviated by incorporating some glycerin with the extracts while still soft. The proportions recommended by the author are:—Extract, 4 parts; glycerin, 1 part; each by weight. Mix intimately by trituration in a mortar, or with a spatula on a slab. Doubtless a smaller quantity of glycerin would suffice, but the above is easy for calculating. Fifteen months ago the author tried this plan with three extracts (belladonna, hyoseyamus, and physostigma), and he now finds these extracts to be still of the same consistence, and equal in their therapeutic effects to those freshly prepared.

Liquid Extract of Cinchona. Dr. B. H. Paul. (*Pharm. Journ.*, 3rd series, xvi. 561.) The author publishes a series of experiments showing that the official process of the new Pharmacopœia shares to a great extent the defects of the older process, in not securing anything like a complete exhaustion of the bark. The paper also contains suggestions of improvements in the process.

Extractum Cinchonæ Liquidum, B. P. Dr. J. E. de Vrij. (*Chemist and Druggist*, 1886, 77, 78.) The author offers the following advice to the makers of *extractum cinchonæ liquidum*, B. P.:—

1. As about 20 per cent. of the alkaloids of the bark are invariably retained in the marc, in order to obtain an extract containing 5 per cent. of alkaloids it is absolutely necessary to select a bark containing not less than 6.25 per cent. of total alkaloids.

2. For every 10 drachms of alkaloids contained in the bark $6\frac{1}{3}$ fluid drachms of hydrochloric acid (sp. gr. 1.160) must be used, as 100 fluid drachms of such an acid contain nearly 37.367 drachms of HCl.

3. The marc should not be thrown away, but the alkaloids left in it should be extracted for some other purpose, using the same quantity of acid which has been taken for the preparation of the extract.

Commercial Fluid Extract of Cinchona. W. F. Southall. (*Pharm. Journ.*, 3rd series, xvi. 779.) The process for the estimation of the total alkaloid is given in the Pharmacopœia upon the unfinished product, but this is afterwards to be brought to the required strength by the addition of water, or by evaporation, according to the quality of the bark used, and the amount of exhaustion to which it is subjected. 100 fluid parts should contain 5 parts of total alkaloids.

The author has examined a number of commercial specimens of this extract, the method of procedure being as follows:—5 c.c. of the liquid extract were submitted to evaporation, to drive off the spirit which it contained (but this was found by comparing results to be unnecessary). The liquid was then placed in a stoppered glass separator, and about half an ounce of benzolated amylic alcohol and excess of soda were added, and shaken together thoroughly and repeatedly, and then allowed to remain at rest until the spirituous solution of alkaloids had separated and formed a distinct stratum over the dark coloured alkaline solution of the other constituents of the extract. The latter was run off, and the contents of the separator washed with a little water to remove adhering alkaline solution. The alkaline solution and washings were treated with a further portion of benzolated amylic alcohol, and the two portions mixed and carefully evaporated in a tared porcelain dish by the heat of a water-bath, until a perfectly dry residue remained, which was proved by the weight becoming constant.

This was found to be the case after an average exposure of about two hours on an open water-bath. No advantage in point of time accrued from using a water oven, as the vapour of benzolated amylic alcohol apparently diffuses more rapidly in the open. This, after subtracting the weight of the dish, multiplied by twenty gave the amount of total alkaloids in every 100 fluid parts of the extract. The following is a table of the results obtained:—

No. of Specimen.	Percent. of Total Alkaloid.	Percent. of Quinine.	Other Alkaloids.
I.	a. 3.964 b. 3.988	1.2	
II.	a. 4.230 b. 4.250	Traces.	Quinidine, 1.7 per cent. Amorphous alkaloid, .25. Remainder mostly Cinchonine.
III.	a. 6.334 b. 6.288	2.248	Quinidine, fair amount. Cinchonidine, small quantity.
IV.	a. 2.900 b. 3.000	.650	Cinchonine, considerable. Quinidine and Cinchonidine, slight amount.
V.	a. 5.22 b. 5.216	2.18	Cinchonine, small amount. Cinchonidine, small amount.
VI.	a. 3.032 b. 3.096	.69	Cinchonidine, slight amount.
VII.	a. 3.440 b. 3.3800	Traces.	Cinchonidine, slight amount.
VIII.	a. 2.1200 b. 2.0300	.996	Cinchonidine, traces; Quinidine, none.
IX.	a. 5.050	.94	Cinchonine, considerable.

The behaviour of these extracts, when diluted with distilled water, varied greatly. It might be mentioned that they were all acid to test paper.

No. 1.—Gave a copious precipitate upon the addition of water, nearly all the colouring matter being carried down.

No. 2.—Gave an immediate precipitate, which became more dense upon standing a few minutes.

No. 3.—Gave a very thick, flocculent precipitate at once upon the addition of water. This liquid extract was also estimated by using ether in the place of benzolated amylic alcohol; and the result obtained was 6.05 per cent., being rather lower than that obtained by using benzolated amylic alcohol.

No. 4.—Also precipitated with water, but not to the extent of No. 3.

No. 5.—At once became cloudy with water, and upon standing a minute formed a thick precipitate, which was of a finer character and darker colour than the others.

No. 6.—Formed no immediate precipitate upon the addition of water, and only slightly after standing in contact for several hours.

No. 7.—Also gave no immediate precipitate with water, and only very slightly on remaining in contact for several hours.

In the first estimation benzolated amylic alcohol was used, and 4.108 per cent. of very black residue was obtained, which upon digesting with dilute sulphuric acid left .668 per cent. of black, amorphous residue, insoluble in acids, alkalies, and alcohol, and only slightly soluble in chloroform. The second estimation was with ether, and a fairly pure residue resulted, weighing 3.3800.

No. 8.—This extract gave a more immediate precipitate than any of the others, a damp glass rod being sufficient for the purpose. The total percentage of residue in *a* was 3.080, but .982 per cent. of an insoluble black residue remained. The total of *b* was 2.66 per cent., with .63 per cent. of insoluble residue. This insoluble residue was apparently the same as in No. 7. It was in appearance like quinoidine or amorphous alkaloid, but could not be such on account of its behaviour with solvents.

No. 9.—Was prepared and standardized by the author in strict accordance with the directions of the Pharmacopœia.

The amount of alkaloid precipitated from sample No. 3, on the addition of water, was determined and found to be 0.272 part (of alkaloid in an impure state) in 100 fluid parts of the liquid extract.

Attention is called by the author to the above results as indicating a great and unsatisfactory variability in commercial specimens of this extract, sold as the article of the B. P., 1885.

Extractum Cinchonæ Liquidum. H. H. Millhouse. (*Pharm. Journ.*, 3rd series, xvi. 959-964.) This paper traverses almost the entire literature of the subject, and shows that a good process for the preparation of this extract, involving no notable loss of alkaloids, is still a desideratum.

The Alcoholic Extract of the Root of Atropa Belladonna. W. Dunstan and F. Ransom. (*Pharm. Journ.*, 3rd series, xvi. 777.) In a further contribution to the chemistry of the pharmaceutical preparations of *Atropa Belladonna*, the authors deal with the alcoholic extract of the root of this plant. They recommend the following process:—About 2 grams of the extract are dissolved with a gentle heat in water acidulated with hydrochloric acid. The liquid is filtered, and the residue washed with dilute hydrochloric acid until the washings yield no precipitate with a solution

of iodine in potassium iodide. The clear liquid is then rendered alkaline with ammonia, and extracted with chloroform until nothing further is removed. Two separate extractions with half its volume of chloroform are usually sufficient for this purpose. The chloroform is next twice agitated with its own volume of water acidulated with hydrochloric acid. It now only remains to render this liquid alkaline with ammonia, and to twice extract it with half its volume of chloroform. The chloroform, when spontaneously evaporated, yields a residue of the crystalline alkaloids (atropine and hyoscyamine), or when evaporated at 100°C . a residue of fused alkaloids which should be dried until it has a constant weight. In these experiments no advantage is gained by evaporating the liquid and drying the residue at a lower temperature, for a residue so prepared undergoes no appreciable decomposition at the higher temperature of 100°C . That the residue obtained in this way is entirely alkaloidal in its nature was proved by the method of precipitation as periodide, which has been described in a previous paper. The following results are cited:—

	Weight of Alkaloidal Residue taken.	Weight of Alkaloid recovered.
<i>a</i>	0.057	0.054
<i>β</i>	0.018	0.0145
<i>γ</i>	0.072	0.0695

Examination of Commercial Specimens.—The amount of alkaloid in various commercial extracts was determined, with the following results:—

Number of Extract.	Percent. of Alkaloid in Normal Extract.	Percent. of Alkaloid in Dry Extract.	Percent. of Water.
I. . . .	1.75	2.08	16.0
II. . . .	1.85	2.36	21.4
III. . . .	3.0	3.60	16.8
IV. . . .	4.45	5.67	21.6
V. . . .	3.20	4.0	20.0
VI. . . .	3.65	4.4	16.8
VII. . . .	3.0	3.55	16.0
VIII. . . .	3.6	4.28	16.0
IX. . . .	1.65	2.04	17.7

The quantity of alkaloid has been calculated in the normal ex-

tract—that is, in the preparation as prescribed and dispensed—and therefore indicates the difference in strength which is experienced in actual practice. The proportion of alkaloid has also been calculated in the dry extract, to admit of an accurate comparison of the variations in alkaloidal content which arise from causes other than differences in consistence.

The great variations which these analyses disclose can scarcely be entirely due to a corresponding variation in the alkaloidal content of the root. They are in great part due to differences in the method of preparing the extract, and especially to the relative quantities of alcohol and water which are employed. The method of the British Pharmacopœia consists in percolating with alcohol, and subsequently with water, to displace the spirit. The water dissolves from the root much albuminoid and mucilaginous matter left undissolved by the spirit; and the extract will be greater in bulk, though weaker in alkaloid, than when alcohol alone is used and removed from the marc with a filter-press.

An extract was prepared from a specimen of root (containing about .3 per cent. of total alkaloid) with alcohol alone. It contained 2.8 per cent. of total alkaloid. When an extract was prepared as directed by the British Pharmacopœia, only 1.7 per cent. of alkaloid was found in the product. Hence it is clear that in order to prepare extracts that shall be uniform in alkaloidal strength, it is necessary to determine by experiment the kind and quantity of the solvent which should be used. This the authors hope to be able to do.

This extract contains, in addition to the alkaloids atropine and hyoscyamine, chrysotropic acid, $C_{12}H_{10}O_5$, probably a naphthalene derivative, which causes alkaline solutions of the extract to have a distinct fluorescence (Kunz, *Archiv der Pharm.* [3], xxiii. 722). It also contains much dextrose, and gives indications of the presence of another alkaloid, which the authors are investigating.

Proportion of Alkaloid in Extract of Belladonna. H. Kunz. (*Journ. de Pharm.*, January 15, 1886.) Recent leaves of *Belladonna* contain 0.15–0.60 per cent. of atropine, and the roots 0.30–0.60 per cent. The extract contains, according to German analyses, 1.3–1.6 per cent. of atropine. Le Roy Weber finds 2.57 per cent. in an extract according to the American Pharmacopœia. The author finds among the bases choline, which he had previously recognised in the flowers of the elder.

Physiological Action of the Extract of Grindelia Robusta. Dr. Dobroklonsky. (*Pharm. Journ.*, 3rd series, xvi. 919.) The

author has studied the action of the fluid extract of *Grindelia robusta* clinically and physiologically. He reports that he has found it to have a great effect on the heart, causing it to beat more slowly and more regularly, but in this resembling *digitalis*, being more effectual than the better known drug for this purpose. It has also a more powerful influence on the heart than *Adonis vernalis*, *Convallaria majalis*, or chloral hydrate, and it may with advantage be given in combination with *Adonis vernalis* in obstinate cases of heart disease, where various remedies have been tried without success. With regard to the diuretic effect of *Grindelia robusta*, the author finds that it is not very great, being less than that of *digitalis* or of *Adonis vernalis*.

Penicillium Ferment in Pharmaceutical Extracts. M. E. Cocardas. (*Pharm. Journ.*, 3rd series, xvi. 590, from *Bull. de la Soc. Botanique de France*.) The author describes and figures the various forms of *Penicillium* ferment grown on different pharmaceutical extracts, and arrives at the conclusion that the ferment causes in the extract changes comparable to those effected by heat, viz., the absorption of oxygen and disengagement of carbonic acid, with formation of water, causing in consequence dilution of the extract. The exact chemical changes are, however, complex, and vary with the special extract. The *Penicillium* itself is subject to a series of variations, but all are varieties in the evolution of a single form.

The Strength of Commercial Tincture and Extract of Opium. W. P. Want. (*Pharm. Journ.*, 3rd series, xvi. 959.) Two estimations of each sample were made, and the process used was that recommended in the British Pharmacopœia, 1885, such quantities of the tincture and extract being taken as would yield about 10 grains of morphine, thus obviating any correction for the solubility of morphine in the mother liquor.

The following list contains the results obtained from the estimation of six samples of tincture of opium, which were procured from leading wholesale houses :—

Percentage of Morphine.					
Estimation.					
		Sp. Gr.	A B		Grs. per oz.
1.	.	.937	.762	.74	3.34
2.	.	.936	.751	.757	3.3
3.	.	.931	.593	.586	2.6
4.	.	.936	.732	.751	3.3
5.	.	.939	.766	.77	3.4
6.	.	.935	.723	.714	3.18

Taken as a whole, these samples may be regarded as fairly satisfactory, there being only one important deviation from the official standard (·75 per cent.).

Six samples also of extract were estimated, and as will be seen from the appended table, the results were far less satisfactory :—

						Percentage of Morphine. Estimation.	
						A	B
1.	.	.	.	.	.	19·997	19·87
2.	.	.	.	.	.	9·93	10·05
3.	.	.	.	.	.	18·27	18·36
4.	.	.	.	.	.	14·29	14·35
5.	.	.	.	.	.	18·76	18·89
6.	.	.	.	.	.	20·37	20·28

Only two of these specimens were of the official strength (which is 20 per cent.). In two the variation, though sufficiently serious, was relatively slight compared with the other two, amounting to a deficit of 5·5 and 8 per cent. respectively of the proper quantity of morphine; but in the two remaining cases the results were somewhat startling, one extract containing under three-fourths, and the other no more than one-half of the prescribed quantity.

Tincture of Kino. R. Rother. (*Amer. Journ. Pharm.*, 1886, 333-336.) The author recommends the following process for preparing a permanent tincture of kino, which is not liable to gelatinization :—

Kino	.	.	.	.	.	.	1½ troy ounce.
Catechu	.	.	.	.	.	.	½ „
Alcohol	.	.	.	.	.	.	4 fluid ounces.
Water	.	.	.	.	.	.	sufficient to make 1 pint.

Powder the kino and catechu, mix them, add 10 fluid ounces of water, heat for ten or fifteen minutes with constant stirring, and let the mixture cool. Now add water to the measure of 12 fluid ounces, and then add the alcohol. Pour the mixture into a bottle containing 60 grains of filter paper, shake the whole well at intervals, and strain the tincture through fabric after twenty-four hours.

Elixirs of Quinine. R. Rother. (*Amer. Journ. Pharm.*, October, 1885, 477-483.)

Compound Elixir of Quinine.

Cinchonine Sulphate	250 grains.
Quinine „	145 „
Cinchonidine „	128 „
Calcium Hypophosphite	114 „
„ Carbonate, precipitated . .	1 troy ounce.
Oil of Anise	8 minims.
„ Caraway	16 „
„ Ceylon Cinnamon	16 „
Sugar, granulated	48 troy ounces.
Alcohol,	
Water, of each sufficient to make . .	1 gallon.

Dissolve the sugar in 4 pints of water, and add 18 fluid ounces of alcohol. Rub the oils thoroughly with the precipitated calcium carbonate, and then gradually add, with constant stirring, 8-10 fluid ounces of the preceding mixture.

Pour this now into the remainder of the saccharine solution, and set the mixture aside, shaking it up frequently; then, after an interval of about two hours, filter it, returning the first turbid portion; and when all has passed through, follow with water until the filtrate measures $7\frac{1}{2}$ pints.

Upon the calcium hypophosphite pour 2 fluid ounces of water, and warm the mixture on a water-bath. Now add the sulphates of the alkaloids, and when double decomposition is complete, remove the mixture from the water-bath, and gradually add 4 fluid ounces of alcohol; then pour it into a small filter, and when all the liquid has passed through, follow with alcohol until the filtrate measures 8 fluid ounces. Then pour this into the simple elixir first obtained, and mix the whole.

Elixir of Quinine, Iron, and Strychnine.

Ferric Citrate	261 grains.
Quinine Sulphate	140 „
Sodium Hypophosphite	68 „
Calcium „	28 „
„ Carbonate, precipitated . .	60 „
Strychnine, powdered	2 „
Oil of Anise	1 minim.
„ Caraway	2 „
„ Ceylon Cinnamon	2 „
Sugar, granulated	6 troy ounces.
Alcohol,	
Water, of each sufficient to make . .	1 pint.

Dissolve the sugar in 7 fluid ounces of water, and add $1\frac{1}{2}$ fluid

ounce of alcohol. Rub the oils thoroughly with the precipitated calcium carbonate, and then gradually add, with constant stirring, $1-1\frac{1}{2}$ fluid ounce of the preceding mixture. Pour this now into the remainder of the saccharine solution, and set the mixture aside, shaking it up frequently; then, after an interval of about two hours, filter it, returning the first turbid portion, and when all has passed through, follow with water until the filtrate measures 13 fluid ounces.

Upon the calcium hypophosphite pour half a fluid ounce of water, and warm the mixture on a water-bath. Now add the quinine sulphate, and when double decomposition is complete, remove the mixture from the water-bath and gradually add 1 fluid ounce of alcohol; then pour it into a small filter, and when all the liquid has passed through, follow with alcohol until the filtrate measures 2 fluid ounces. Then pour this into the simple elixir first obtained, and mix the whole. Mix the ferric citrate, sodium hypophosphite, and 1 fluid ounce of water, and apply heat until complete solution has occurred. Now pour the elixir of quinine hypophosphite previously finished into this solution, and if necessary add water to the measure of 1 pint, and mix the whole; then add the strychnine, and when this has dissolved, filter the elixir if necessary.

Detection of Aloin. J. Dietrich. (*Amer. Journ. Pharm.*, 1885, 404.) The author has studied the detection of aloin in animal secretions and excretions, and found the following reactions serviceable for this purpose:—

$\text{H N O}_3 + \text{K Cy}$.—The residue left on evaporating the alcoholic solution was dissolved in a few drops of nitric acid, the solution evaporated by means of a steam-bath, dissolved in alcohol, and the deep red solution treated with a drop of alcoholic solution of potassium cyanide, which produced a rose-colour with five different aloins.

In the following tests the aloin residues were dissolved in a little water:—

Chloride of gold produced with barbaloin a raspberry-red colour (still recognisable with 0.0006 gram of aloin), after some time changing to violet. Socaloin and Cape-aloin gave a rather faint colour, rapidly changing to violet; nataloin, red-violet, rapidly changing to violet; Curaçao aloin, bright red.

Brominated potassium bromide gave a distinct turbidity with the aloins of Barbadoes, Socotra, and Curaçao; none with Port Natal or Cape aloin.

Tannin gave a turbidity only with barbaloin, probably due to a decomposition product.

For the detection of aloin the fæces were digested with water acidulated with sulphuric acid, then macerated for twelve hours with 3 volumes of strong alcohol, the filtrate concentrated, and the residue successively agitated with petroleum, benzin, and amylie alcohol; on evaporating the latter aloin was left. The treatment of blood and urine was similar. From his results, the author concludes that on taking aloes or aloin, the greater portion is excreted with the fæces; a small portion only is absorbed, and passes mostly through the kidneys; while the remainder enters the liver, and with the bile is conveyed back into the intestines.

Assaying of Ignatia. S. M. Harrington. (*Amer. Journ. Pharm.*, 1886, 14.) The author assayed three samples of ignatia, two of which were purchased in the powdered state, while the last one was powdered by the author. For the first sample, Dragendorff's process was used: 15 grams were boiled three times in succession with dilute sulphuric acid; the united decoctions, nearly neutralized with magnesia, were evaporated to a syrupy consistence; the residue mixed with 2.4 times its volume of alcohol; the filtrate evaporated to 30 c.c., shaken with chloroform, and, after this had been removed, rendered alkaline with ammonia, and repeatedly agitated with chloroform to extract the alkaloids; these were dried, weighed, dissolved in hydrochloric acid, the solution evaporated, the salts weighed and then dissolved in water and titrated with potassio-mercuric iodide, when the weight of strychnine and brucine is calculated from the weight of the mixed alkaloids or of the salts.

The last two specimens were assayed by the process for preparing strychnine as given by the U.S.P., 1870, the brucine being separated from the mixed alkaloids by washing with diluted alcohol. The following results were obtained:—

No. 1 yielded 1.039 per cent. Strychnine and 0.355 per cent. Brucine.

No. 2 " 1.125 " " " 0.41 " "

No. 3 " 1.425 " " " 0.475 " "

Incompatibility of Chloral Hydrate with Alcohol in the Presence of Potassium Bromide. G. F. H. Markoe. (*Druggists' Circular*, August, 1885.) The conclusion to be drawn from the author's experiments is that alcoholic preparations should not be prescribed with chloral hydrate, especially not in connection with the bromides of potassium and sodium; because, if the solutions used

are at all concentrated, the chloral will separate as alcoholate, float on the surface, and a great risk will be incurred of giving a large over-dose; the patient having received no caution with regard to the necessity of shaking the contents of the bottle before taking a dose.

Chloral Camphor. C. W. Albright. (*Amer. Journ. Pharm.*, 1886, 282.) Chloral hydrate and camphor were mixed in different proportions. The mixture made with 1 part of the former and 7 parts of the latter was slightly damp after seven days, but could easily be rubbed to powder; made with 3 parts of camphor, the powder became granular in a day; and, with 2 parts of camphor, it was not only granular, but showed also the presence of a thick liquid. Equal parts of the two compounds soon became liquid; but with an increase of the chloral hydrate, a white powder remained in the liquid, and when the proportion reached 7 of chloral hydrate to 1 of camphor, the pasty, opalescent mass separated gradually a thick, oily liquid.

The liquid obtained from equal parts of the two compounds, on being agitated with water does not decrease in bulk. It distils slowly, without change and without leaving any residue, when heated in a bath of ammonium chloride; but when direct heat was applied, a portion of the oily liquid distilled over unaltered, and was followed by a white, camphor-like sublimate, which was soluble in alcohol; from which solution, on the addition of water, a thick, oily liquid was precipitated. The yellowish brown residue in the retort gave with alcohol a colourless solution, which had an odour of a mixture of chloral, camphor, and cedar, and with water gave an oily precipitate. Chloral-camphor dissolves in 60 per cent. alcohol, and on the addition of water is again deposited unchanged.

On mixing solutions of chloral hydrate in 5 parts of water, and of camphor in 5 parts of alcohol, the mixture remains clear; but on the addition of water becomes turbid, and finally deposits an oily liquid like that resulting from direct union. Substituting chloroform for the alcohol, the mixture of the two solutions separates into an aqueous and a denser layer; the latter, on the spontaneous evaporation of the chloroform, leaving oily chloral camphor.

On treating chloral camphor with glycerin, and then with water, a white, flocculent mass is obtained, answering to all the tests of camphor. On boiling a mixture of equal parts of chloral camphor, glycerin, and water, an upper layer is formed, which

gelatinizes on cooling to an opaque, greasy mass, which is liquefied by the heat of the hand. On boiling equal parts of glycerin and chloral camphor in a test-tube, a clear liquid results, which on cooling becomes opaque, and so nearly solid that the tube may be inverted without the mass falling out; this is soluble in alcohol, though less freely than chloral camphor, this oily compound being deposited on the addition of water.

Mixed with strong sulphuric acid, chloral camphor forms a clear liquid, passing through various shades of yellow, red, and brown, becoming nearly black, and gradually separating above small crystals uniform in shape, which in contact with water become liquid and sink to the bottom in globules. The acid mixture has a peculiar fragrant odour.

Nitric acid dissolves a portion of chloral camphor, assuming at the same time a greenish yellow colour.

Chloral Menthol. H. V. Becker. (*Amer. Journ. Pharm.*, 1886, 283.) Menthol is usually applied in the form of cones or pencils, and from time to time solutions in alcohol, benzin, chloroform, ether, olive oil, glycerin, etc., have been suggested. The author suggests a combination of menthol with chloral hydrate, which is prepared from equal weights of the two compounds, triturating them together, and heating in a water-bath, not above 96° F., until complete liquefaction is effected. Thus prepared, chloral menthol is an oily, colourless liquid, having a distinct, mint-like odour, a warm aromatic and camphoraceous taste, and at 58° F. the specific gravity 1.1984. It is completely soluble in all proportions in alcohol, freely so in benzin, and also soluble in chloroform, ether, and carbon bisulphide. A few drops of the liquid brought in contact with an equal quantity of sulphuric acid, gave off almost immediately a disagreeable odour, the mixture becoming yellow, then orange in the centre, and on the border surrounded by a greenish, then green band, which soon darkened. On being now stirred with a glass rod, the mixture is blue, and dissolves in alcohol with little or no colour; the solution, neutralized with potassa, and heated, acquires a straw colour, potassium sulphate being precipitated. If the mixture of oily liquid and acid be kept for some time, two layers are formed, one being dark green, the other nearly colourless; on agitation with water, the latter is dissolved, leaving a dark green, unctuous mass.

Menthol melting near 92° F., the preparation is regarded as a solution of chloral hydrate in liquefied menthol, the mixture remaining liquid.

Chloral menthol was used by several physicians with favourable results. Dr. L. Wolff was much pleased with its effects in several cases of facial neuralgia, and regards it as superior to menthol pencils and to chloral camphor; while it burns and smarts to some extent, this is considerably modified by the cooling action of the menthol. Dr. L. W. Steinbach observed some relief from its use in a case of headache due to gastric disturbances. Dr. C. Seiler found it more decisive than menthol cones in subduing the pain of neuralgia of the temporal region; it produces more smarting, which, however, is not disagreeable. Dr. E. Rosenthal considered it useful in every form of neuralgia; in decayed teeth, applied with absorbent cotton, the pain was allayed in from one to five minutes; it was also used with benefit in migraine, in headache due to biliousness, and in headache due to uterine disease.

Note on Aqua Camphoræ. C. J. S. Thompson. (*Pharm. Journ.*, 3rd series, xvi. 265.) The author recommends the following formula as yielding a product which can be relied upon for the definite strength of 1 grain to the ounce:—

R	Camphor	.	.	.	.	.	.	gr.xx.
	Absolute Alcohol	.	.	.	.	.	.	℥xx.
	Aq. destill.	.	.	.	.	.	.	℥xx.

Dissolve the camphor in the alcohol, and gradually add the water; shake well, and in a short time the whole of the camphor will be dissolved.

Note on Vinum Ipecacuanhæ. (*Chemist and Druggist*, June 12, 1886.) A correspondent suggests the following modification of the B. P. process for the preparation of this wine:—Macerate the bruised ipecacuanha in the acetic acid for twenty-four hours, after which place on a water-bath and evaporate till acetic vapour ceases to be given off. Then macerate the root in a pint of wine for seven days, and filter.

The ipecacuanha is thus quite exhausted of its alkaloid, as is shown by Thresh's reagent giving only the merest trace of a precipitate with a second maceration of the residue. A sample of wine made by the above process three months ago has as yet shown no signs of a precipitate.

The Separation of Tannin from Sherry and Orange Wines intended for use in Pharmacy. T. Maben. (*Chemist and Druggist*, April 17, 1886.) The author recommends the addition of 1 ounce of isinglass, not previously dissolved, to $\frac{1}{2}$ gallon of the wine. After

standing for several weeks, the wine is practically free from tannin, and may then be decanted or filtered.

By the use of these detannated menstrua, ipecacuanha and quinine wines may both be prepared with every confidence that the result will be satisfactory.

Japanese Rice-Wine and Soja-Sauce. Prof. F. Cohn. (*Pharm. Journ.*, 3rd series, xvi. 610.) The author has recently described the mode in which he has manufactured the Japanese saké or rice-wine in the laboratory. The material used was "tane kosi," i.e., grains of rice coated with the mycelium, conidiophores, and greenish yellow chains of corrodia of *Aspergillus Oryze*. The fermentation is caused by the mycelium of this fungus before the development of the fructification. The rice is first exposed to moist air, so as to change the starch into paste, and then mixed with grains of the "tane kosi." The whole mass of rice becomes in a short time permeated by the soft white shining mycelium, which imparts to it the odour of apple or pineapple. To prevent the production of the fructification, freshly moistened rice is constantly added for two or three days, and then subjected to alcoholic fermentation from the *Saccharomyces*, which is always present in the rice, but which has nothing to do with the *Aspergillus*. The fermentation is completed in two or three weeks, and the golden-yellow sherry-like saké is poured off. The sample manufactured contained 13.9 per cent. of alcohol. Chemical investigation showed that the *Aspergillus* mycelium transforms the starch into glucose, and thus plays the part of a diastase.

Another substance produced from the *Aspergillus* rice is the soja sauce. The soja leaves, which contain little starch, but a great deal of oil and casein, are boiled, mixed with roasted barley, and then with the greenish yellow conidia powder of the *Aspergillus*. After the mycelium has fructified, the mass is treated with a solution of sodium chloride, which kills the *Aspergillus*, another fungus, of the nature of a *Chalaza*, and similar to that produced in the fermentation of "sauerkraut," appearing in its place. The dark-brown soja-sauce then separates.

Note on Sweet Spirit of Nitre. G. E. Perry. (*Pharm. Journ.*, 3rd series, xvi. 125.) The author's experiments indicate that this preparation suffers considerable deterioration if kept in the usual large size bottles met with on the shelves of pharmacies, and that it should be kept in smaller bottles and in a cool place.

Spirit of Nitrous Ether. E. Davies. (*Pharm. Journ.*, 3rd series, xvi. 773.) The experiments recorded by the author tend to

show that the official spirit of nitrous ether is a most difficult preparation to keep in a state answering to the Pharmacopœia standard of quality, owing to the rapid deterioration it is prone to undergo when kept in a bottle which is frequently opened.

Syrup of Hypophosphites with Quinine and Strychnine. C. E. Dohme. (*Chemist and Druggist*, December, 1886.) The author contributes to the proceedings of the Maryland Pharmaceutical Association the following formula for a syrup intended to replace Fellow's syrup of hypophosphites, and containing the hypophosphites of calcium, sodium, potassium, iron, manganese, quinine and strychnine :—

Take of—

Hypophosphite of Calcium . . .	740 grains.
Sodium . . .	256 "
Potassium . . .	192 "
Manganese . . .	192 "
Sulphate of Iron (crystal) . . .	370 "
Strychnine	4 "
Sulphate of Quinine	128 "
Diluted Sulphuric Acid	q.s.
" Hypophosphorous Acid	q.s.
Distilled Water	q.s.
Sugar	24 troy ounces.
Orange-flower Water	1 ounce.

Dissolve 228 grains hypophosphite of calcium in 4 fluid ounces distilled water, and the sulphate of iron in 2 fluid ounces distilled water; mix and filter. Dissolve the remainder of the hypophosphite of calcium, together with the hypophosphites of sodium, potassium, and manganese, in 4 fluid ounces of hot distilled water, using about 1 to 2 fluid drachms of diluted hypophosphorous acid to dissolve them; mix with the two solutions, and set aside. Dissolve the strychnine in 2 drachms of distilled water, by the aid of a few drops of hypophosphorous acid, and again mix with the other solutions. Now dissolve the sulphate of quinine in about 8 ounces of water, using sufficient diluted sulphuric acid to dissolve it, and precipitate the quinine with sufficient diluted aqua ammonia (about 1 part to 6 of water), until ammonia is in *slight* excess. Wash the precipitated quinine on a fine muslin strainer, and transfer the moist light quinine to a mortar or small dish, and rub it into a smooth paste; then gradually add enough diluted hypophosphorous acid to dissolve it, which solution is also added to the solutions of the other hypophosphites, making the whole fluid measure about 16 fluid ounces. To this add the

granulated sugar and orange-flower water, and dissolve cold by agitation in a bottle. When the sugar is all dissolved, filter the syrup, and add sufficient distilled water to make the whole measure 32 fluid ounces. The syrup may be flavoured with a little extract of vanilla, if preferred to the orange-flower water.

It contains in each fluid drachm hypophosphite of calcium, 2 grains; of sodium, 1 grain; potassium, $\frac{3}{4}$ grain; manganese, $\frac{3}{4}$ grain; iron, $\frac{3}{4}$ grain; quinine, $\frac{1}{2}$ grain; and of strychnine, $\frac{1}{64}$ grain. It is best kept in full well-stoppered bottles.

As some may prefer the syrup without either the iron or manganese, either one or both may be left out, and the formula otherwise followed as described above.

Spiritus Ammoniaë Aromaticus. G. H. Seward. (*Pharm. Journ.*, 3rd series, xvi. 701.) The author suggests the following modified formula:—

Take of—

Rectified Spirit	30 pints.
Oil of Lemons	3iv. 3ss.
Essential Oil of Nutmegs	3ij. 5viss.
Distilled Water	10 pints.

Mix, and distil over slowly to 34 pints. Dissolve separately—

Volcanic Carbonate of Ammonia . .	20 ounces.
Distilled Water to	4 pints.

To this add—

Strong Solution of Ammonia	2 pints.
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Mix this with the distillate.

Product, 5 gallons; specific gravity, '896.

Note.—If it is found that the water does not dissolve all the carbonate, it may, with advantage, be first warmed; but this should not be necessary.

It will be observed that the only alteration in this process is introducing less water into the still, or more strictly speaking, distilling off less water, and thus being able to use more of it to dissolve the ammonia.

It is worthy of note that the flavour of the product made in this way is superior to that made by the B. P. process.

Pill Excipients. J. B. Morris. (*Pharm. Journ.*, 3rd series, xvi. 126, 127). Gum resins and resins make a good mass with spirit, cautiously added drop by drop, the resin being previously rubbed to a fine powder. In warm weather it will sometimes be

found impossible to reduce gum resins to fine powder, so that they require to be gently warmed in a water-bath and worked into a mass with the other ingredients. Pills containing fluid resins, fluid balsams, or volatile oils, are best made with melted cacao butter. Phosphorus, when prescribed in pills, should be dissolved in bisulphide of carbon, and whilst it is dissolving two or three drops of chloroform may be added, which produce a heavy vapour around the solution, and prevent the oxidation of the phosphorus by the atmospheric oxygen. A little liquorice powder may now be added, and the mass quickly made workable with tragacanth paste, divided into pills and coated. Carbolic acid is best made into pills with powdered liquorice or flour, $1\frac{1}{2}$ gr. to 2 grs. of acid.

Camphor, after being powdered with a few drops of spirit, makes a good mass with tragacanth paste.

Acetate of potash may be made into pills with Canada balsam, and will remain stable.

Pulv. ext. colocynth, or pulv. pil. colocynth co., may be easily worked into a mass with a few drops of decoct. aloes co., as it contains an alkali.

Tragacanth paste should not be used to mass croton chloral, as it dissolves it. Confection of hips and mucilage is better.

Citrate of iron and quinine makes a good pill, with just a drop of water; but, being deliquescent, the pill will not keep long.

Copaiba makes a firm pill, with the addition of a small quantity of carbonate of magnesia.

Creasote, if ordered with oxide of silver in a pill, will explode, unless the oxide be first diluted by trituration with liquorice or gentian powder before adding the creasote.

The author had occasion to dispense permanganate of potash pills containing 2 grains of the permanganate in each, with no excipient given in the prescription. He used kaolin and vaseline, which made an excellent mass. Glycerine or sugar would have exploded with the permanganate. The author also dispensed about the same time one dozen pills containing pil. aloes et ferri, ext. belladonna, and 2 grains permanganate of potash, making in all a 6-grain pill. A good mass was made with cacao butter, kaolin, and vaseline; but the bulk of the pills being objectionably increased, it was found necessary to divide them into twenty-four instead of twelve pills, at the same time informing both the physician who prescribed and the patient of the change. The dose, of course, was doubled. They were somewhat difficult to

make, owing to the permanganate coming into contact with vegetable substances, namely, the ext. belladonna and the aloes.

At a former time, pills containing carbolic acid and pulv. opii massed very well, with the addition of a little pulv. glycyrrhizæ, without any other excipient. The carbolic acid being deliquescent and volatile, they were of course coated.

In making Bland's pills, a double decomposition takes place between the sulphate of iron and the carbonate of potash, which turns them into a thin, muddy liquid after standing for twenty minutes. They are then massed with pulv. tragacanth. The old formula for making them was equal parts of ferri sulph. and potassæ carb.; but as they were found to be too alkaline, an improved formula is given in Martindale's "Extra Pharmacopœia," namely:

R Ferri Sulphatis	.	.	.	.	.	grs. ijss.
Potassæ Carb.	.	.	.	.	.	grs. iss.
Pulv. Sacchar. Albi.	.	.	.	.	.	gr. j.
Pulv. Tragacanth.	.	.	.	.	.	gr. $\frac{1}{8}$

M. Ft. pil.

These are much more easily and quickly made, besides keeping in a better condition, and not turning as hard as stones in a few days, as the old ones almost invariably did.

Paraffin as an Excipient for Deoxidizable Substances. G. Smith. (*Pharm. Journ.*, 3rd series, xvi. 957.) The author confirms the value of Martindale's excipient (*Year-Book of Pharmacy*, 1885, p. 230) for pill masses containing deoxidizable substances, such as nitrate of silver and permanganate of potassium. It is rather less successful, however, for pills containing chloride of gold.

Lanoline. T. Maben. (*Chemist and Druggist*, May 29, 1886.) The author gives an interesting account of this new ointment base, and its application in pharmacy. As this paper is not suited for abstraction, the reader is referred to the above source.

Oleate of Mercury. E. Painter. (*Proc. Amer. Pharm. Assoc.*, 1885.) The results of the author's experiments are summed up in the following conclusions:—

1. Pure oleic acid for the preparation of a 20 per cent. oleate of mercury is equal to an acid containing a small percentage of stearic acid, though not superior to it; but for the preparation of an oleate of the officinal strength, it might preferably contain sufficient stearic acid to make it of the consistence of a soft solid.

2. Purified red oil, made from good, fresh fat, is in every way suitable for making this oleate.

3. Very finely triturated red oxide of mercury is preferable to the yellow oxide, and no artificial heat whatever should be employed in making this preparation.

4. Oleate of mercury is best prepared by the direct union of the oxide and acid.

5. Petroleum ointment is a proper diluent for the oleate containing a less percentage of mercury than the combining proportions, and to facilitate its preparation about an equal weight of the petroleum ointment should be mixed with the oxide before the acid is added.

6. Glycerite of starch (plasma) will probably be found a suitable excipient for diluting this oleate.

7. The idea that true oleates are formed only by double decomposition is absurd; just as much of a chemical compound as is formed by mixing a mineral acid with base, being formed by making an oleate from oil and a base, the former being the source of the oleic acid when the oleate is made by double decomposition.

Oleate of Manganese. C. E. Kreyssler. (*Amer. Journ. Pharm.*, August, 1885, 369.) Dr. Martin and others strongly recommend the application of this oleate in cases of amenorrhœa, menorrhagia, and metrorrhagia. It may be obtained by gradually adding, with constant stirring, solution of castile soap to a solution of manganese sulphate, warming the mixture, and then freeing the precipitated oleate from sodium sulphate by repeated washing with warm distilled water. The product is pale pinkish grey in colour, of a sweet and musty taste and peculiar odour, sparingly soluble in alcohol, but soluble in ether, chloroform, olive oil, and oleic acid.

The method of applying this oleate is as follows:—About 1 teaspoonful of the 20 per cent. solution of the oleate is applied to the abdomen of the patient, and absorption promoted by friction, produced by vigorous rubbing of the surface with the palm of the hand, or fingers, continuing the rubbing until absorbed. It may also be applied to the spine, or inner surface of the thighs.

Linimentum Terebinthinæ. W. Baxter. (*Pharm. Journ.*, 3rd series, xvi. 1026.) The results of the author's experiments are tabulated on page 280:—

He arrives at the conclusion that the quantity of water ordered in the B.P. is too small and that it ought to be doubled to produce a satisfactory result. By adding to each of the finished products

Expt.	Soap Used.	Turpentine Used.	Water.	Mode of Mixing.	Result.
1	Labelled B.P. but not of excellent quality.	Commercial.	B.P. quantity of Aq. dest.	Strictly B.P. and in a cold mortar	A fluid which in about one hour separated; the bottom becoming a thick jelly and very difficult to shake up.
2	Common.	Commonest.	—	—	Same result as No. 1, the bottom being highly coloured.
3	Same soap as No. 1.	B.P., wholesale house (C).	—	—	A liquor which separated into two strata in half an hour, but which could by brisk shaking be made very presentable.
4	Ditto.	B.P., wholesale house (U).	—	The water was first completely amalgamated with the soap by gentle heat, as Mr. Clower suggests.	This was somewhat satisfactory. It was a liquid, separating rather quickly into two strata, the bottom rather dark, but it can always be beautifully emulsified by one sharp shake.
5	B.P. excellent quality.	B.P., samp. (T).	—	Mr. Clower's method exactly.	A very thick almost gelatinous mass.
6	—	— T.	B.P. quantity doubled.	Strictly B.P. in a warmed mortar.	A beautiful liquid, white, and permanent emulsion.
7	—	— T.	1·5 times B.P. quantity.	—	Certainly not an emulsion, but a firm jelly, white and permanent.

of Nos. 1, 3, 4, 5 and 7 water to equal double the quantity given in the B.P., and shaking vigorously for some time, the result was in every case a perfect emulsion,—liquid, white, and permanent.

The Absorption of Petroleum Ointment and Lard by the Skin.
E. Jæerss. (From *American Druggist*.) The author has investigated the question whether ointments made with vaseline or other petroleum ointments are really as difficult of resorption by the skin, or of yielding their medicinal ingredients to the latter, as has been asserted. In solving this question, he considered himself justified in drawing conclusions from the manner in which such compounds behaved towards *dead* animal membrane. If any kind of osmosis could take place, he argued, from ointments prepared with vaseline, etc., through dead membranes, such osmosis would most probably also take place through living membranes. At all events, the endosmotic or exosmotic action of the skin of a living body must necessarily play an important rôle in the absorption of medicinal agents; and on the other hand, it is plain that fats which render the living skin impermeable necessarily also diminish, or entirely neutralize, its osmotic action. To test this, the author made the following experiments:—

Bladder was tied over the necks of three wide-mouthed vials, with bottoms cut off, and each was filled with iodide of potassium ointment.

No. 1 contained an ointment made with lard.

No. 2, one made with *unguentum paraffini* (*Germ. Pharm.*); and

No. 3, one made with *unguentum paraffini* mixed with 3 per cent. of lard.

All three vials were then suspended in beakers filled with water. After standing twenty-four hours, at the ordinary temperature, the contents of none of the beakers gave any iodine reaction. After having been placed into a warm temperature, between 25–37° C., all three showed iodine reactions after three hours, Nos. 2 and 3 very strongly, No. 1 (with lard alone) very faintly.

The same experiment was now repeated, with the precaution that the bladder was previously washed completely free from chlorine. Each vial was suspended, at a temperature of 25–27° C., in 50 grams of distilled water. After three hours the contents of No. 1 (containing the ointment made with *lard*) gave *no* iodine reaction, the contents of the other two, however, gave traces. After eight hours no further change had taken place. The temperature was now raised to from 30–35° C., and kept so for eight hours. All three beakers now gave a strong iodine reaction, 0·2

c.c. of normal silver solution being required for each 15 grams of the contents of the beakers.

In addition to the iodide, some of the fatty base had osmosed through the membrane in each case.

The next experiment was made by substituting a piece of the skin (freed from chlorine by washing) of a freshly killed sheep for the bladder. The ointment in No. 3 in this case was made with 10 per cent. of lard. No reaction was obtained at the ordinary temperature after twelve hours; nor after eight more hours at a temperature of 25–30° C. After letting them stand for eight hours longer at 30–37° C., a faint reaction was obtained in the case of the ointment made with *unguentum paraffini*; a still fainter with No. 3; but no reaction at all with No. 1 (that made with lard). None of the fats passed through by osmosis. After eight hours more, the iodine reaction was quite decisive in all cases, but no fat had passed through even now. On titrating 20 grams of the contents of each beaker,

No. 1 required 0·5 c. c. of silver solution,

No. 3 „ 0·5 „ „

No. 2 „ 0·7 „ „

showing that the most iodine had osmosed in the case of the ointment made with *unguentum paraffini* (equivalent to vaseline).

Medicinal Soaps. Dr. Unna. (*Edinburgh Medical Journ.*, Oct., 1885.) The author started his experiments by preparing a normal soap of fixed composition, which could be incorporated with various medicinal substances. Though, theoretically, he considered that beef fat was the most perfect, still, practically, he found that an advantage was gained by adding 1 part of olive oil to 8 parts of beef fat. The alkali consisted of 2 parts of soda to 1 part of potash, this combination being less apt to blister when medicinal substances were added to the soap. Cocoa-nut oil, though producing a soap which lathers well, he found made the skin dry after continued use. Even a neutral soap, when constantly used, tends to an unpleasant roughness from removing too completely the natural oiliness of the skin. He, therefore, leaves the soap over-fatty, that is, besides the necessary fat for perfect saponification, an excess amounting to 3 or 4 per cent. is added. Any secondary addition of glycerine or vaseline he entirely rejects. As simple applications to the skin, these are best applied mixed with water, or pure. This soap he terms over-fatty normal soap (*über fettete grund Seife*). It may be used as an ordinary washing soap in all

forms of inflammatory skin diseases, where ordinary soap is forbidden; as in eczema, erythema, sudamina, for skins poor in fat, with a tendency to dryness. Also as a soap for the healthy, whose occupation—as many medical men—compels them to wash frequently in the course of the day. It consists of:—

16 parts best Ox-fat	59·3 per cent.
2 „ Olive Oil	7·4 „
6 „ 38° Beaumé Soda Ley	22·2 „
3 „ „ Potash Ley	11·1 „
—	—
27	100·0

In this soap-mass about 4 per cent. of oil remains unsaponified. It is yellowish white, of a waxy consistence, and quite permanent. It forms an exceedingly good soap for children, and if rubbed on the hands, and after a few minutes wiped off again with a dry towel, it leaves the hands smooth, and little liable to be injuriously affected by damp cold, or long-continued contact with carbolic acid.

Over-fatty marble soap consists of equal parts of the normal soap and the finest powdered marble. This will be found useful in thinning down the horny layer in acne and in parakeratoses. It thus replaces pumice-stone and sand soap, and while the powdered marble rubs off the scales or the thickened epidermis, the over-fatty normal soap leaves the polished surface smooth and normally unctuous.

Over-fatty Ichthyol Soap.—This has its special value in the treatment of various forms of rosacea, both in the congestive and the cyanotic forms, and it can be employed advantageously with hot water. In the slightest varieties the patient should wash frequently, especially after lunch and at bed-time, with the over-fatty ichthyol soap and pretty hot water. If a non-active effect is to be produced, the hot soapy lather should be wiped off and the skin powdered. A still stronger effect is produced by leaving the soapy lather to dry. The peculiar smell of ichthyol is not very noticeable. Various other substances are also united with the normal soap, such as salicylic acid, oxide of zinc, and tannin.

Medicated Soaps used in Skin Diseases. J. V. Shoemaker. (*Medical Bulletin*, from a paper read before the Pennsylvania State Medical Society.)

Alum Soap.—Sapo Aluminus. 10 per cent., or 168 grains of alumen.

Arnica Soap.—Sapo Arnicæ. 10 per cent., or 168 grains ext. arnicæ.

Boro-Glyceride Soap.—Sapo boro-glycerite. 10 per cent., or 168 grains of boro-glycerite.

Camphor Soap.—Sapo camphoræ. 10 per cent., or 168 grains camphoræ.

Carbolic Acid Soap.—Sapo carbolic. 5 per cent., or 84 grains acidi carbolic.

Chamomile Soap.—Sapo anthemidis. 10 per cent., or 168 grains ext. anthemidis.

Chamomile and Sulphur Soap.—Sapo anthemidis sulphurisque. 10 per cent., or 168 grains ext. anthemidis; 5 per cent., or 84 grains sulphuris loti.

Eucalyptol Soap.—Sapo eucalyptol. 5 per cent., or 84 minims ol. eucalypti.

Naphthol Soap.—Sapo naphthol. 5 per cent., or 84 grains of naphthol.

Salicylic Acid Soap.—Sapo acidi salicylici. 4 per cent., or $67\frac{1}{2}$ grains acidi salicylici.

Sublimate Soap.—Sapo hydrargyri chloridi corros. 1 per cent., or $16\frac{2}{3}$ grains hydrargyri chloridi corrosivi.

Tar Soap.—Sapo picis liquidæ. 10 per cent., or 168 grains picis liquidæ.

Amber Soap.—Eau de luce. A liquid soap which has for its chief ingredients tincture of oil of amber and balsam of Gilead, with water of ammonia. Used in enlarged glands, moles, warts, etc.

Balsam Soap.—5 per cent., or 84 grains balsami Peru. Used in indolent ulcers, sinuses, abscesses, etc.

Elder-Flower Soap.—Sapo sambuci flor. 10 per cent., or 168 grains sambuci florum. Used in intertrigo, rosacea, sunburn, etc.

Ergot Soap.—Sapo ergotæ. 10 per cent., or 168 grains ext. ergotæ. Used in eczema, acne, rosacea.

Glycerine Soap.—Sapo glycerin. 15 per cent., or 252 grains of glycerin. Used for roughness of the skin, chaps, pityriasis, etc.

Naphthol Sulphur Soap.—Sapo naphtholi sulphurisque. 3 per cent., or $50\frac{1}{2}$ grains naphtholi; 10 per cent., or 168 grains sulphuris loti. Used in scabies (itch), phtheiriasis (lousiness), insects of all kinds on the skin, eczema, psoriasis, seborrhœa, hyperidrosis, bromidrosis, etc.

Sulphur Soap.—Sapo sulphuris. 10 per cent., or 168 grains sulphuris loti. Used in acne, rosacea, etc.

Iodine Soap.—Sapo iodi. 3 per cent., or $50\frac{1}{2}$ grains iodi resub-

limati. Used in syphilitic and scrofulous skin affections, old granulations, etc.

Iodide of Sulphur Soap.—Sapo sulphuris iodidi. 3 per cent. sulphuris iodidi, $50\frac{2}{5}$ grains in a cake. Used in acne indurata, chronic ulcers, freckles, yellowish brown or blackish patches on the skin, etc.

Kino Soap.—Sapo kino. 10 per cent., or 168 grains ext. kino. Used in eczema, rosacea, ulcers, etc.

Lead Soap.—Sapo plumbi. 3 per cent., or $50\frac{2}{5}$ grains plumbi acetat. Used in boils, carbuncles, abrasions, bed-sores, etc.

Tannin Soap.—Sapo acidi tannici. 3 per cent., or $50\frac{2}{5}$ grains acidi tannici. Used in seborrhœa oleosa, excessive sweating, ulcers, granulations, etc.

Tannin Balsam Soap.—Sapo tanno-balsamicus. 2 per cent., or $33\frac{3}{5}$ grains acidi tannici; 5 per cent., or 80 grains balsami Peru. Used in wounds, ulcers, chilblains, etc.

Thymol Soap.—Sapo thymol. 3 per cent., or $50\frac{2}{5}$ grains thymoli crystallisati. Used in ulcers, wounds, abscesses, sinuses, pustular eczema, etc.

Turpentine Soap.—Sapo terebinthinæ compositus. This soap has been known as Starkey's, and is composed of equal parts of potassium carbonate, oil of turpentine, and Venice turpentine. Used in chilblains, syphilis, psoriasis, etc.

Winter-Green Soap.—Sapo gaultheriæ. 3 per cent., or $50\frac{2}{5}$ grains acidi methylsalicylici. Used in eczema, psoriasis, lichen, acne, etc.

Witch-Hazel Soap.—Sapo hamamelis. 10 per cent., or 168 grains ext. hamamelis. Used in fetid perspiration, eczema, and loss of hair, etc.

Relative Permeability of Various Diaphragms. A. Zott. (*Ann. Phys. Chem.* [2], xxvii., 229. From *Pharm. Journ.*) From the quantitative results obtained on the dialysis of different crystalline and colloid substances, the following conclusions are arrived at:—(1) The most useful, homogeneous, and watertight material as a dialyser is goldbeater's skin, which is twice as effectual under the same conditions as parchment paper, hitherto considered on the authority of Graham to be the best substance. But in the case of solutions which attack organic membranes, ordinary clay cells are the most useful, although their permeability is 60 to 75 times less than that of goldbeater's skin. (2) The rapidity of the diffusion is increased by the complete exhaustion of the air collected within the pores of the dialyser; the rapidity is also dependent

rather on increase of volume of the solution than on increase of mass dissolved. After a preliminary exhaustion, endosmose takes place even in the case of slowly diffusible substances, such as the so-called colloids. (3) Two or more substances present in a solution are more rapidly and completely separated the greater the difference of their diffusion velocities; the terms colloid and crystalloid are purely relative. (4) Separation by dialysis is more rapid the more often the liquid in the outer vessel is renewed. (5) With decrease of concentration, the diffusion velocity of salts, whether dissolved separately or admixed, decreases up to a certain point, from which it again increases slowly.

NOTES AND FORMULÆ.

PART III.

NOTES AND FORMULÆ.

Copaiba Emulsion. Van de Walle. (From *Druggists' Circular*.)
The author emulsifies copaiba balsam according to the following recipe:—

Balsam of Copaiba	.	.	.	.	50	grams.
White Sugar	.	.	.	.	25	„
Honey	.	.	.	.	25	„
Distilled Water	.	.	.	.	5	„
Essence of Mint	.	.	.	.	0·5	„
Carmine (to colour)	.	.	.	.	.	q. s.

The balsam, sugar, honey, and water are mixed together in a basin, and slightly heated for ten minutes, with constant stirring. The essence and colour are added when the mixture is completely cold. The preparation forms a red gelatinous product, almost entirely devoid of the odour of the copaiba.

Syrup of Hippurate of Lime. Dr. M. G. Guignard. (*Chemist and Druggist*, from *Répertoire de Pharm.*) The author gives the following:—

Pure Hippuric Acid	.	.	.	.	1	gram.
Milk of Lime	.	.	.	.	.	q. s.
(To produce alkaline reaction.)						
Hot Water	.	.	.	.	20	c.c.
Sugar	.	.	.	.	24	grams.
Alcoholate of Lemon	.	.	.	.	0·15	gram.

The antidiabetic solution of hippurate of lime is prepared in the same way, minus the sugar.

Treatment of Animal Charcoal. P. Degener and J. Lach. (*Dingl. polyt. Journ.*, cclvi. 519.) When freshly ignited bone-black is moistened with as much water as it will absorb, and is exposed to air and light, hydrogen peroxide is said to be evolved in noticeable quantity. The purifying power of animal charcoal is increased by this treatment. By substituting alkaline liquids

(especially milk of lime) for water, the peroxide of the alkalies and alkaline earths are produced.

Sodio-Bismuth-Tartrate and Pepsin. R. Rother. (*Amer. Journ. of Pharm.*, September, 1885.) The formula recommended by the author is as follows:—

Pepsin, saccharated	. . . . .	100	grams.
Bismuth Subnitrate	. . . . .	10·5	„
Strychnine	. . . . .	0·21	gram.
Chlorhydric Acid, diluted	. . . . .	12·5	fl. grams.
Alcohol	. . . . .	50	„
Glycerin	. . . . .	200	„
Orange-flower Water	. . . . .	200	„
Nitric Acid,			
Tartaric Acid,			
Sodium Bicarbonate,			
Water, of each sufficient to make	. . . . .	800	fl. grams.

Mix the bismuth subnitrate with 40 fluid grams of water, and gradually add nitric acid, with constant stirring, until a clear solution is obtained. To this now add 7·65 grams of tartaric acid and 80 fluid grams of water. The solution is then treated with sodium bicarbonate until about three-fourths of the nitric acid is neutralized. The crystalline magma of bismuth tartrate is now poured upon a plain filter and washed with water till practically free from nitric acid. Now mix 2·9 grams of sodium bicarbonate with 5 fluid grams of water, and gradually add 2·55 grams of tartaric acid. With this solution mix the washed bismuth tartrate, and stir them together occasionally until a clear solution has resulted.

Mix the diluted chlorhydric acid with water to the measure of 200 fluid grams, and add the orange-flower water. Pour this mixture upon the saccharated pepsin, and transfer the resulting magma to a bottle having double the capacity; cork it well, and immerse it in a water-bath having a constant temperature of 40° C. for the time of one hour, shaking the bottle at intervals. Pour the resulting pepsin solution into a beaker, or graduated measure, and add sodium bicarbonate until neutralization is effected. To this liquid then add the solution of bismuth sodio-tartrate, and carefully follow with more sodium bicarbonate until the gelatinous precipitate which had formed is redissolved. Now incorporate the strychnine and 2 grams of tartaric acid; transfer the solution to a filter, returning the first turbid portions that pass; and when all the liquid has passed through, follow with water, if necessary, through the filter, so that the filtrate measures

550 fluid grams. To this now add the alcohol and glycerin previously united, and mix the whole.

Preservation of Milk. F. Hueppe and W. Eugling. (*Bied. Centr.*, 1885, 415, 416.) All ferments in milk are destroyed by repeated heating to 65–70°, but it is doubtful whether this method is as practical as that in which the milk is heated to 100° in an atmosphere of steam, although by this last process the taste is affected. By heating to 100°, casein and calcium phosphates are slowly and gradually deposited, but this occurs less if the evaporation is carried to one-third in a vacuum. Analyses of milk preserved without additional sugar are given.

Aseptol. E. Serrant. (*Comptes Rendus*, c. 1544–1547; *Journ. Chem. Soc.*, 1885, 1166.) The author quotes further experiments to show that aseptol (orthohydroxyphenylsulphonic acid) is superior to phenol or salicylic acid as an antiseptic.

A Strong Antiseptic. G. Sternberg. (*Pharmaceut. Centralhalle*, 1885, No. 10.) The preparation recommended by the author combines the antiseptic effects of corrosive sublimate with those of potassium permanganate, and contains 2 grams of each of these two preparations in a litre of water. The dark colour of this poisonous mixture is referred to as an additional advantage.

Anisic Acid as an Antiseptic and Antipyretic. J. M. Maisch. (*Amer. Journ. of Pharm.*, 1886, 299.) *Anisic acid* has been recommended as an antiseptic application for sores, and as an antipyretic remedy which resembles salicylic acid in its action and has slightly toxic effects. The acid is an oxidation-product of anethol, and may be prepared from oil of anise, and other volatile oils containing anethol, by oxidation with nitric acid or with potassium bichromate. Zervas recommended its preparation from 6 parts of the bichromate, 9 of water, and 7 of sulphuric acid, to which mixture 1 part of anise oil is added; after the reaction has subsided, cold water is added, and the acid is purified by recrystallization.

Anisic acid has the formula $C_8H_8O_3$, crystallizes in colourless glossy needles or rhombic prisms, is inodorous, has a slight taste and an acid reaction, and dissolves in alcohol, ether, and hot water, crystallizing from the latter solution on cooling. It melts at 175° C., and volatilizes at a higher temperature. Its alkali and ferrous salts are insoluble in water; most of the other salts are sparingly soluble, and may be obtained in crystals by double decomposition in sufficiently diluted solutions. Schultzen and Graebe ascertained, in 1867, that in the animal economy anisic acid forms *anisuric acid*, $C_{10}H_{11}NO_4$, which is a substitution-product of glycocoll.

Hydronaphthol as an Antiseptic. Dr. G. R. Fowler. (*N. Y. Med. Journ.*, October 3, 1885.) *Hydronaphthol*, a derivative of naphthalin, according to the author is a more efficacious antiseptic than carbolic acid. It crystallizes in silvery white or greyish laminae, has a slight aromatic odour and taste, is not irritating or poisonous, does not volatilize at an ordinary temperature, but sublimates at about 90° C.; is soluble in about 1,000 parts of water, and dissolves freely in alcohol, ether, chloroform, glycerin, benzol, and fixed oils. Its compounds with alkalies and alkaline earths are readily decomposed by carbonic acid. The saturated aqueous solution will perfectly preserve for an indefinite time animal tissues and fluids; when volatilized for purposes of fumigation, the vapour of hydronaphthol has no obnoxious effect upon the organs of respiration, nor will it injure textile fabrics. The powder, mixed with 50 times its weight of magnesium carbonate, fuller's earth, or kaolin, may be dusted on wounds and drainage tubes; and absorbent gauze, cotton, jute, wood flour, sawdust, etc., may be impregnated with it by means of the alcoholic or benzol solution. The 10 per cent. alcoholic solution perfectly sterilizes, and sufficiently hardens and preserves catgut.

Menthol as a Substitute for Cocaine. Dr. A. Rosenberg. (*Lancet*, July 18, 1885, 128.) The author recommends the use of menthol as a cheap substitute for cocaine in cases where local anæsthesia of the nose, pharynx, or larynx is desired. Its effect is said not to be so lasting as that of cocaine, but menthol has the advantage of being cumulative in its action, later applications producing, even after some interval, a longer period of anæsthesia than the earlier. It is used in the form of alcoholic or ethereal solution, containing 20 to 30 per cent. of menthol.

Menthol Plasters. M. Mayet. (From *Amer. Drugg.*) The author gives the following formula for a substitute for menthol cones. They are to be applied for a few moments at a time to the seat of neuralgic pain:—

Menthol,	
Chloral Hydrate,	āā 50 cgm.
Spermaceti	2 grams.
Oil of Cacao	1 gram.

Menthol Bougies. Dr. Rosenberg. (*Weekly Med. Rev.*, April 24, 1886.) The author recommends the application of gelatin bougies, containing one-sixth grain of menthol, for the relief of reflex neuroses due to nasal disease.

Nasal Bougies of Iodoform. (*Therapeutic Gazette*, August 15, 1885.) To make nasal bougies, cut a slender piece of fine strong sponge, about $1\frac{1}{2}$ inch long, roll between two boards, with pressure, in shape of a thin cylinder, place a piece of strong silk through one end, and melt by gentle heat the vaseline or cosmoline with the white wax, and stir in the iodoform deodorized by the addition of vanillin, coumarin, or cinnamic acid; keep stirring, and immerse the sponge, then withdraw and cool, and immerse again, repeating until large enough (but stirring constantly), or about the size of a goose-quill; then hang up by the silk until cool; then coat with a solution of gelatin containing about 10 per cent. of glycerin, which will easily melt at the temperature of the body. The bougie should be introduced into the nasal cavity at night, and withdrawn the next morning. One will do for several applications.

Iodoform Pencils. (*Pharm. Zeitung*, 1885, No. 29.) Triturate cacao butter with a warmed pestle, and mix well with iodoform until a somewhat soft mass is obtained, which is put into a tin syringe, and by slow pressing formed into sticks of convenient length.

Antidote for Iodoform. Dr. Behring. (*Louisville Medical News*.) The author found tablespoonful hourly doses of a 20 per cent. solution of bicarbonate of potassium to act as a prompt antidote in iodoform poisoning.

Ethyl Carbamate, a New Hypnotic. R. v. Jaksch. (*Chem. Centr.*, 1886, 155.) This substance, which was first recommended as a hypnotic by Schmiedeberg and Jolly, has been tried by the author in twenty cases. Doses of 0.1 gram induce a certain and quiet sleep, not followed by any evil after-effects. It acts essentially on the brain.

Menthol as a Remedy in Urticaria and Pruritus. (*Amer. Journ. of Pharm.*, April, 1886.) Among the myriad of remedies for these troublesome affections there is no other which affords such complete and instantaneous relief as a solution of menthol. Not only is the itching relieved for the time, but a cure seems to be effected. In pruritus ani and in eczema, moistening the parts with menthol solution causes an immediate cessation of the pain. The solution should contain from 2 to 10 grains of menthol to the ounce of water.

Antipyrin as a Remedy in Sunstroke. Dr. B. T. Westbrook. (*Medical Times*, September 19, 1885.) The author records two cases of sunstroke in which antipyrin was successfully employed

as a remedy. The dose given was 20–30 grains in hypodermic injection, a 50 per cent. solution being used. It is said to produce very little irritation when made of this strength.

Coffee as a Deodorant and Vehicle for Medicines. Dr. Oppler. (From *Therapeutic Gazette*.) The author finds that finely-powdered roasted coffee completely covers the odour of iodoform. The coffee should be roasted, rubbed up in a mortar to an extremely fine powder, and then mixed with the iodoform in the proper proportion. For example, the following may be given:—

Iodoform	1 parts.
Paraffin (soft)	10 „
Coffee (powdered)	0.3 „

Oppler also suggests rather a novel use for the coffee, viz., to render castor oil palatable, and he has found children take the following paste readily:—

Castor Oil	20 parts.
White Sugar	10 „
Coffee (powdered)	10 „

M. A teaspoonful for a dose.

Preparation of Aqueous Solutions of Carbon Disulphide and of other Antiseptic Preparations by means of the Sulpholeates. A. M. Jacobs. (*Moniteur Scientifique*, July, 1885.) With 1 part of an alkaline sulpholeate and 1 or 2 parts of benzol, carbon disulphide, oil of turpentine, etc., perfectly clear liquids of an oily constitution are obtained which, on the addition of a few drops of ammonia, dissolve in water in any proportion. With the aid of heat sulphur, camphor, thymol, naphthol, phenol, etc., may be dissolved in the sulpholeates in considerable proportions.

Solutions of Iodine in Oils. (*Amer. Journ. of Pharm.*, September, 1885.) A 20 per cent. solution in castor oil is of a brown colour and thick; those in olive and almond oil of a brownish red colour and somewhat thinner. For practical purposes the solution in castor oil is of special interest as being miscible with strong alcohol and mitigating some inconveniences resulting from the use of tincture of iodine. G. Greuel recommends the following formula: Dissolve with a gentle heat iodine, 10 parts, in castor oil and alcohol (93 per cent.), each 45 parts.

Medicinal Use of Potassium Bichromate. (*Amer. Journ. of Pharm.*, September, 1885, 459.) Güntz (“*Memorabil.*”) speaks highly of this drug in cases of syphilis which resist treatment with mercury, and in which the constitution has been badly broken

down by the disease. Not only is there a complete absence of general disturbance after the use of chromium, but, according to the writer, the cure is rapid and complete. The daily amount which he employs is half a grain of potassium bichromate, divided into four doses. Güntz denies that headache ever followed the use of the drug.

Powdered Rice as a Styptic. (*N. Y. Med. Journ.*, January 16, 1886.) According to the *Indian Medical Gazette*, powdered rice is stated to have marked hæmostatic properties. Mixed with lint, in the proportion of from 4 to 11 per cent., the lint thus treated being used as a compress, it is more effectual than oxide of zinc, sub-nitrate of bismuth, salicylic acid, or carbolic acid.

A New Hemostatic. Prof. Bonafoux. (From *Chemist and Druggist*.) At a recent meeting of the Academy of Medicine, at Paris, the author read a paper upon a powder which possesses great hemostatic powers, and is capable, it is said, of arresting the bleeding of large arteries, so that it will prove serviceable in important surgical operations. This powder is composed of equal parts of colophony, carbon, and gum arabic. Experiments have been tried with it on the brachial artery in man and on the smaller vessels, on the carotid of the horse, and other blood-vessels of the same animal, with marked success.

Hydriodic Acid as a Remedy for Asthma. (*Amer. Drugg.*, May, 1886.) Hydriodic acid is growing in favour as a remedy for asthma. A syrup containing 1 per cent. of the acid may be taken in doses of ʒss. to ʒi., although doses of ʒi. are usually quite sufficient. It should be well diluted, and when liable to cause eructations of gas, or disturbance of the stomach during digestion, should be taken before meals, and repeated three or four times daily.

Coca Leaf Cigars and Cigarettes. (*Amer. Journ. of Pharm.*, December, 1886, 613.) Dr. Lewis has been using cigarettes composed in part of coca leaf and partly of tobacco, for about nine years, in the treatment of throat affections. Dr. F. E. Stewart (*Phil. Med. Times*, September 19, 1885) has employed a cigar made of coca leaf with a wrapper of mild imported tobacco; also a cigarette of coca wrapped with rice paper, and a "smoking tobacco" made of coca without admixture of any kind, which may be smoked in a pipe. By the use of these preparations the peculiar effects of coca were obtained, though in a milder degree than after taking it internally.

Disguising the Taste of Quinine. H. Engel. (*Med. and Surg. Rep.*, 1886, 278.) The author has accidentally discovered that in the following combination the taste of quinine is completely disguised:—

Quinæ Sulphatis	. . . . .	1 grain.
Ammonia . . . . .	. . . . .	1 „
Pulv. Glycyrrhizæ	. . . . .	4 grains.

M. fiat pulvis.

Larger doses may be given with the same proportion of liquorice and ammonium chloride; but it does not appear necessary to increase the liquorice so much, 10 grains being sufficient for 10 grains of quinine.

Naphthalin Leaves. (From *Chemist and Druggist.*) Naphthalin leaves are now introduced in Germany as a substitute for camphor in the preservation of goods from moths. The sprinkling of powdered or crystallized naphthalin on articles of apparel has many inconveniences, hence the idea to manufacture the leaves, containing about 50 per cent. of naphthalin, and prepared in such a manner as to prevent it from falling off when the leaves are bent or touched by hand. Each leaf weighs about half an ounce.

Application for Neuralgia. (From *Phil. Med. Times.*)

Chloral Hyd.	. . . . .	0·50 grain.
Menthol . . . . .	. . . . .	0·50 „
Cacao Butter . . . . .	. . . . .	1 „
Spermaceti . . . . .	. . . . .	2 „

M. Make it into a cone-shaped mass.

Local Application for Gout. (From *Amer. Drugg.*) Dr. Rothe recommends for gouty joints the repeated use of cold douches, followed by applications of the following lotion:—

Liquor. Plumbi Acetatis	parts 15
Spiritus Vini	„ 25
Tr. Opii Ammoniat.	„ 5
Aquæ Fortis	„ 300

Apply with compresses, and cover with rubber tissue. Great relief from pain is said to follow.

Lotion for Freckles. (From *Amer. Drugg.*)

℞ Hydrarg. Bichlor.	gr. xij.
Acid. Hydrochlor.	ʒij.
Fruet. Amygd. Amar.	ʒiss.
Glycerini (Price's)	ʒi.
Tinct. Benzoin	ʒij.
Aqua Florum Aurant.	q. s.

Dissolve the corrosive sublimate in three ounces of the orange-flower water, add the hydrochloric acid, and set aside. Blanch the bitter almonds, and bruise them in a Wedgewood mortar adding the glycerin, and using the pestle vigorously; a smooth paste is thus obtained. Then add gradually about nine ounces of the orange-flower water, stirring constantly, continuing this operation until a fine, creamy emulsion is the result. Subject this to violent agitation—preferably with the aid of a mechanical egg-whisk—and allow the tincture of benzoin to fall into it the while, drop by drop. Then add the mercurial solution, filter, and make up the whole to the measure of one imperial pint with more orange-flower water.

Ointment for Freckles. (From *Brit. and Colonial Druggist*.)

Bismuthi Subnitr.	5ij.
Ung. Simpl.	3ij.

M. Apply to the skin at night, and remove in the morning with a little cold cream previous to washing.

Lotion for Sun-Burns. (From *Amer. Drugg.*)

℞ Acidi Citrici	3 ij.
Ferri Sulphatis Puri.	gr. xviii.
Camphoræ	q.s.
Aq. Flor. Sambuc.	3iij.

The sulphate of iron must be in clear green crystals unless the “granulated” form, which is preferable, be available, and in either case the salt should be fresh and free from oxidized portions, or “rustiness”; it should be dissolved in half the elder-flower water (all of which is better if not quite recently distilled, or being quickly raised to the boiling point and cooled out of contact of air before use), the citric acid being also in solution in the other half, and the two fluids mixed, filtered if necessary, and bottled immediately, a piece of camphor about the size of a small peppercorn to be added to the contents of each bottle.

Plaster for Removing Moles. (*Chemist and Druggist*, October, 1886.) To remove moles or birth-marks, the following compound is said to have been successfully employed:—Take tartar emetic in impalpable powder, 15 grains; soap plaster, 1 drachm, and beat them to a paste. Apply this paste to nearly a line in thickness (not more), and cover the whole with strips of gummed paper. In four or five days eruption or suppuration will set in, and in a few days leave in place of the birth-mark only a very slight scar.

Impermeable Russian Plaster. E. Dietrich. (From *Pharm. Centralhalle*.)

Oxide of Zinc	5 parts.
Castor Oil.	5 „
Collodion	90 „

Rub the oxide of zinc with the castor oil to a perfectly smooth paste, then mix it with the collodion.

Pour the mixture, in the same way as photographers do, upon plates of glass, and repeat the process until the layer has acquired the thickness of gold-beater's skin. Next coat the surface of the layer with solution of isinglass, allow to dry, and strip the layer from the glass.

This plaster is used (with the isinglass coat next the skin) as a dressing in place of ordinary adhesive plaster.

When preparing larger quantities, the mass is poured into a trough and the plate dipped in it. In this case a uniform coat can be obtained only by immersing the plate each time by a different edge first.

Lotion for Inflammation. (From *Chemist and Druggist*. Dr. John W. Martin, of Sheffield, in the *Medical Press and Circular*, recommends the following as an excellent lotion for subduing inflammation, and reducing the œdema of the inflamed parts, and especially in the intense inflammation of the arms which follows re-vaccination:—

Tr. Opii, Camph. co.	ʒij.
Tr. Tolutani	ʒij.
Liq. Plumbi Diacetat.	ʒiv.
Glycerine	ʒij.
Aquæ, ad	ʒxx.

M.

A piece of lint, or old linen, to be well wetted with the lotion, and to be applied to the inflamed part. The wetting to be repeated at frequent intervals.

Internally it is useful to combine the following mixture with the use of the foregoing lotion:—

Potass. Bicarb.	ʒiss.
Tr. Nucis Vom.	℥xl.
Ferri. Am. Cit.	ʒiss.
Sp. Am. Aromat.	ʒiss.
Aquæ, ad	ʒviiij.

Liq. M. 1 drachm three or four times a day.

Maury's Ointment. J. W. England. (*Amer. Journ. of Pharm.*, 1886, 84.) Under this name an unctuous solid was first formulated and introduced into the Philadelphia Hospital, some eight years ago, by Dr. Maury, then a visiting physician of that institution, for the external healing treatment of sores, ulcers, etc., in general, and as especially serviceable in external affections of the skin dependent upon venereal origin. Since that time, in the medical practice of the hospital referred to, it has been constantly employed by the resident physicians, with a more than ordinary uniform success.

The author publishes the following formula, remarking that the original formula contained simple cerate (Ceratum, U.S.P.) as the diluent, in the place of cosmoline:—

℞ Nitrate of Mercury Ointment	. . . . .	5i.
Powdered Rhubarb,		
Powdered Opium	. . . . .	āā ʒss.
Cosmoline, q.s. ad	. . . . .	ʒi.

Triturate the rhubarb and opium together with the cosmoline, until a perfectly smooth, homogeneous product is obtained. Then admix with it the citrine ointment, after having previously rubbed the same with about one fluid drachm of glycerin to remove any granulation present, using in the latter action a bone spatula to work with.

The ointment, when freshly made with cosmoline as the diluent, is a soft, unctuous, greenish brown solid, readily melting at the temperature of the body, and capable of being absorbed by the skin. It changes rapidly, on exposure to air, to a very deep brown colour. The partial change of chemical nature, as evidenced by the change of colour, does not appear to affect the medical qualities of the article in question, as the old ointment has proved as efficacious as the new.

Its mode of application is somewhat peculiar and worthy of especial mention. The part to which the ointment is to be applied must first be poulticed with a hot "Labarraque poultice," that is, a poultice of flaxseed meal, made with hot "Labarraque's solution" (Liquor sodæ chloratæ, U.S.P.), instead of the hot water ordinarily used. After remaining on for awhile, the poultice is removed, and frequently takes with it portions of dead tissue. The skin is then carefully dried, the ointment spread upon soft lint and applied twice a day, or varying according to the severity of the case, until the sore, etc., is healed.

Lotion for Fœtid Perspiration of the Feet. (*Amer. Journ. of Pharm.*, September, 1885, 450.) Martin (*Bull. Gen. de Thérap.*) recommends the following solution :—

Permanganate of Potassium	15 grams.
Thymol	30 „
Distilled Water	30 ounces.

Inner soles made of filtering-paper, cotton, or some like material, are to be moistened with the solution, and new ones should be used every morning.

Remedy for Ringworm. Dr. W. T. Alexander. (*Amer. Journ. of Pharm.*, September, 1885, 437.) In a note upon the treatment of ringworm of the scalp, the author recommends epilation and the use of a 10 per cent. solution of chrysarobin in liquor gutta-perchæ, which forms a pellicle upon the surface, preventing the further extension of the disease. This treatment was very successful.

Dunlap's Diarrhœa Mixture. (*Amer. Journ. of Pharm.*, August, 1885.)

℞ Tincture of Opium,	
Tincture of Camphor,	
Tincture of Peppermint	āā ʒss.
Tincture of Ginger	ʒiij.
Tincture of Capsicum,	
Hoffman's Anodyne	āā ʒss.

M. Dose—a teaspoonful, diluted with sweetened water, after each operation. This is especially good in cholera morbus.

Whooping-Cough Mixture. (*Amer. Journ. of Pharm.*, August, 1885.) Dr. A. Platt has found the following mixture to answer remarkably well :—

℞ Copaibæ,	
Balsam Tolut.,	
Pulv. Acaciæ	āā ʒss.
Aquæ	ʒiv.
Acid. Sulphuric. Aromat.. . . .	gutt. xx.

Mix the acacia with the balsams, and gradually add the acidulated water. Dose—a teaspoonful when required, three, four, or five times a day.

Pills of Oil of Thyme as a Remedy for Rheumatism. (From *Bull. Général de Thérap.*) The following formula is recommended :—

Volatile Oil of Thyme	10 grains.
Soap	10 „
Powdered Althæa	q. s.

Divide into six pills; two to be taken before each meal.

Anti-Rheumatic Mixture. H. K. Lines. (*Amer. Journ. of Pharm.*, August, 1885.) The author has obtained good results with the following:—

℞ Vini Colechici Sem.	℥ss.
Tincture Gentian. Comp.	℥iiss.
Potass. Iodid.	℥ij.

Mix. Sig. Teaspoonful three times a day in a wineglassful of water.

Remedy for Toothache. Prof. Ludovici. (*Rundschau*, 1885, 400.) The author recommends the following for toothache arising from decayed teeth:—

Dry Extract of Opium,	
Camphor,	
Balsam of Peru	āā 0·5 part.
Mastic	1 „
Chloroform	10 „

To be applied in the cavities of carious teeth.

Remedy for Hay-Fever. Dr. A. F. Samuels. (From *N. Y. Med. Journ.*)

Camphor,	
Chloroform	āā 1 drachm.
Extract of Belladonna	4 grains.
Bicarbonate of Sodium	20 „
Benzoinated Lard	1 ounce.

Rub together the first three, then add the lard, and lastly the bicarbonate of sodium. Apply freely to the nostrils with the little finger.

Linseed Tarlatan. M. Laillier. (*Chemist and Druggist*. From *Journ. de Pharm. et de Chim.*) The author, who has previously urged the preference of dry linseed meal to the crushed linseed with oil, suggests the adoption of “linseed tarlatan” as a clean and convenient substitute for poultices. His method is to boil 1 ounce of linseed meal, deprived of oil, in water for ten minutes, so that the decoction shall measure about a litre. This is strained, while warm, through a hair sieve, and (still while warm) a long piece of tarlatan is plunged in it and withdrawn, held out till the liquid ceases to drop from it, and then applied in several folds

to the part where the poultice would be applied. It is covered over with some impermeable tissue. Antiseptics may be dissolved in the water if required.

Preparation of Curd Soap. F. Eichbaum. (*Dingl. polyt. Journ.*, cclv. 539.) For the preparation of a good curd soap with silvery fracture, the author proposes boiling 700 kilos. of tallow with soda-ley of 15° to a clear jelly, and introducing 450 kilos. of palm-nut and 100 kilos. of cocoa-nut oil, with the requisite quantity of caustic ley of 23° . The mixture is then boiled until a clear jelly, free from froth, is obtained. After the lapse of two hours, any scum upon the surface is removed, and the product salted, or precipitated respectively with salt solution of 20° , or caustic soda-ley of 40° .

Preparation of Soaps from Oil Seeds. B. Seeman. (*Dingl. polyt. Journ.*, cclvi. 287.) The kernels of cocoa-nuts, palm-nuts, and the seeds of the cotton plant, etc., are crushed and boiled with soda-ley of 20° B. until the combination of the oil in the seeds with the soda is completed. The husks and shells of the seeds and kernels are deposited by salting out or adding a strong solution of soda. The soap is then separated from the leys by a further process of salting out.

Stable Corrosive Sublimate Soap. (*Amer. Journ. Pharm.*, 1886, 165, 166.) Unna, in an article on medicinal soaps, stated that a stable soap of corrosive sublimate would be of great value to physicians. Owing to the rapidity with which mercuric chloride is decomposed by soap, it is very difficult to make a soap which would answer the purpose. According to Geissler, a stable soap can be made by mixing corrosive sublimate with soap containing an excess of fatty acid (not fat). If the soap contains an excess of alkali, dark spots appear and gradually get larger, until the soap turns black and, lastly, silver-grey. This does not occur in soap made as Geissler suggests, hence colour can be considered a criterion of efficacy. Prof. Johne experimented with a 1 per cent. corrosive sublimate soap, and found it to be a powerful disinfectant.

Ointment for Chapped Hands. (From *Chemist and Druggist*.)
Van Harlingen commends this formula:—

Oxide of Bismuth	4 grams.
Oleic Acid	30 "
White Wax	12 "
Vaseline	36 "
Oil of Roses	2 drops.

Apply the mixture three times a day.

Lanolin. (*Pharm. Journ.*, 3rd series, xvi. 707.) The following formulæ have been given as examples of the use of this new basis :—

1. *Unguent. Belladonnæ.*

Extr. Belladonnæ	5.
Lanolini	45.

2. *Unguent. Conii.*

Extr. Conii	5.
Lanolini	45.

3. *Unguent. Cerussæ.*

Cerussæ	30.
Adipis	10.
Lanolini	60.

4. *Unguent. Diachylon.*

Empl. Plumbi Simpl.	50.
Ol. Olivar	20.
Lanolini	30.

5. *Unguent. Diachylon.*

Empl. Plumbi Simpl.,	
Lanolini	ā ā 45.
Adipis Suilli	10.

6. *Unguent. Hydrarg. Album.*

Hydrarg. Præcip. Albi	10.
Adipis	10.
Lanolini	80.

7. *Unguent. Hydrarg. Cinereum.*

Hydrargyri	50.
Lanolini	12·5.
Ungt. Hydrarg. Ciner.	2·5.
Sebi	25.
Lanolini	87·5.

8. *Unguent. Potassii Iodidi.*

Potassii Iodidi	20.
Aquæ	10.
Adipis	20.
Lanolini	150.

9. *Unguent. Plumbi.*

Liq. Plumbi Subacet.	8.
Adipis	10.
Lanolini	82.

10. *Unguent. Zinci.*

Zinci Oxydati	10.
Adipis Benzoinati	10.
Lanolini	80.

11. *Unguent. Chrysarobini.*

Chrysarobini	10-20.
Adipis	10.
Lanolini	80.

12. *Unguent. Iodoformi.*

Iodoform	10.
Adipis	10.
Lanolini	80.

13. *Unguent. Cinnabar.*

Cinnabar	10.
Adipis	10.
Lanolini	80.

14. *Unguent. Argent. Nitric.*

Argent. Nitrici	1.
Lanolini	8.
Adipis	1.

15. *Unguent. Acid. Pyrogallici.*

Acid. Pyrogallici	10.
Adipis	10.
Lanolini	80.

16. *Unguent. Picis Liquid.*

Picis Liquidi	20.
Lanolini	80.

17.

Balsam. Peruvian	10.
Ol. Terebinth.	20.
Lanolini	70.

18. *Unguent. Boricum.*

Acid. Borici	10.
Adipis	20.
Lanolini	70.

19. *Unguent. Carbolic.*

Acid. Carbolic.	5.
Adipis	5.
Lanolini	90.

20. *Unguent. Acid. Salicylic.*

Acid. Salicylic.	. . . . .	10.
Adipis	. . . . .	20.
Lanolini	. . . . .	70.

21. *Unguent. Naphtholi.*

β -Naphtholi	. . . . .	5.
Adipis	. . . . .	10.
Lanolini	. . . . .	85.

Non-Fatty Bases. (*Edinburgh Medical Journal*, August, 1885.)

In cases of varicose ulcer and eczema of the leg, Unna recommends the application of a paste of a non-fatty nature. The following is the formula :—

R Zinci Oxidi,	
Gelatin	. . . . . āā 10·0
Glycerini et Aquæ	. . . . . āā 40·0

This is to be painted on warm. A bandage is afterwards applied. It is evident that gelatin pastes may have a wide use as substitutes for fatty ointments. To form the paste, the gelatin should be steeped in three-fourths of the water until soft, three-fourths of the glycerin added, and solution effected by means of the water-bath. The oxide of zinc (or any similar powder) should be rubbed in a mortar along with a fourth of the glycerin; when smooth the remainder of the water mixed with it, and the whole added to the gelatin solution.

For nasal bougies, Dr. Hunter Mackenzie recommends a gelato-glycerin basis, the formula for which is,—

Gelatin	5j.
Aquæ Destillat.	ʒiss.

Soak for twelve hours, then add—

Glycerin	ʒiss.
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and dissolve in a water-bath.

Antiseptic Mouth Wash. Dr. Miller. (From *Deutsch. Med. Wochenschr.*)

Thymol.	. . . . .	4 gr.
Benzoic Acid.	. . . . .	45 gr.
Tincture of Eucalyptus.	. . . . .	3½ fl. dr.
Water	. . . . .	25 fl. oz.

The mouth is to be well rinsed with this mixture, especially just before going to bed, since most of the damage by fermentative and

putrefactive processes in the mouth is done at night, during sleep, unless the exciting cause be previously removed or rendered inert.

Alkaline Dentifrice. F. Vigier. (From *Répertoire de Pharm.*) As the alkaline ingredient is usually bicarbonate of sodium, which imparts a disagreeable taste to the mixture or solution, the author proposes the following combination, in which the taste is tolerably well masked :—

Bicarbonate of Sodium	20 grams.
Alcoholate of Peppermint	20 „
Oil of Peppermint (finest)	20 drops.
Carbonate of Magnesium	2 grams.
Distilled Water	980 „

Mix the water and alcoholate, and dissolve the bicarbonate in the mixture. Triturate the oil with the carbonate of magnesium, add the previously prepared solution gradually, and filter.

Walnut Hair Oil. (From *Chemist and Druggist.*) Crush 2 ounces of fresh green walnut shells with $\frac{1}{4}$ ounce of powdered alum to a smooth paste; digest with 10 ounces of benzoinated oil in a water-bath until all aqueous vapour has been driven off. Perfume with two drops of otto of roses and 10 drops of oil of neroli.

The walnut shells are best obtained about the end of August or beginning of September. They contain, besides an oil and other constituents, a substance resembling pyrogallic acid, and impart a brown shade to the hair.

Preparation for the Removal of Hair. Prof. Bartholow. (*Amer. Drugg.*) The author recommends the following :—

Sulphide of Barium,	
Lime	āā ʒi.
Powdered Starch	ʒij.

Make into a paste with alcohol, and apply until some pain is felt, and then remove it. The long-continued use of this often results, he says, in the permanent removal of offending hair.

Quinine Hair Tonic. (From *Chemist and Druggist.*)

Quinine Sulphate.	20 grs.
Glycerin	1 oz.
Cologne	2 „
Bay Rum	2 „
Rose Water	11 „

Rub the quinine with the glycerin, and add the other ingredients in order named. The addition of fluid extract of jaborandi is recommended to stimulate the growth.

Sachet Perfumes. (From *Chemist and Druggist*.)*1. Cassie Sachet.*

Cassie Flowers, ground	1 lb.
Orris Root, powdered	1 lb.

2. Frangipanni Sachet.

Orris root, powdered	3 lbs.
Vetiver, ground	$\frac{1}{2}$ lb.
Santal Wood, ground	$\frac{1}{4}$ lb.
Vanilla, ground	$\frac{1}{2}$ lb.
Tonka Beans, ground	2 oz.
Oil Neroli	60 m
„ Santal	40 m
„ Bergamot	60 m
„ Geranium, French	60 m
„ Rose.	30 m
Extract, Musk	1 oz.
„ Civet	$\frac{1}{2}$ oz.

3. Heliotrope Sachet.

Orris Root, powdered	2 $\frac{1}{2}$ lbs.
Rose Leaves, ground	1 lb.
Vanilla, ground	6 oz.
Tonka Beans, ground	4 oz.
Extract, Musk	1 $\frac{1}{2}$ oz.
„ Civet	$\frac{1}{2}$ oz.
Oil Bitter Almonds.	7 m

4. Lavender Sachet.

Lavender Flowers, ground	2 lbs.
Benzoin, powdered	2 oz.
Oil Lavender, French	1 oz.
Extract, Musk.	1 oz.

5. Rose Sachet.

Orris Root, powdered	1 $\frac{1}{2}$ lbs.
Rose Leaves, ground	1 $\frac{1}{2}$ lbs.
Santal Wood, ground	4 oz.
Patchouly, ground	2 oz.
Extract, Civet	$\frac{1}{2}$ oz.
Oil Geranium, French	30 m
„ Rose	20 m

6. Jockey Club Sachet.

Orris Root, powdered	3 lbs.
Santal Wood, ground	$\frac{1}{2}$ lb.
Oil Bergamot	1 oz.
„ Rose	30 m
Extract, Musk.	2 oz.
„ Civet	1 oz.

7. *Patchouly Sachet.*

Patchouly Leaves, ground	2 lbs.
Orris Root, powdered	$\frac{1}{2}$ lb.
Oil Patchouly	30 m
„ Geranium, French	30 m

8. *Verbena Sachet.*

Orris Root, powdered	3 lbs.
Oil Bergamot	120 m
„ Verbena	180 m
„ Geranium, French	30 m
Extract, Musk	$\frac{1}{2}$ oz.

9. *Ylang-ylang Sachet.*

Rose Leaves, ground	1 lb.
Cassie Flowers, ground	1 lb.
Pimento, ground	$\frac{1}{4}$ lb.
Tonka Beans, ground	2 oz.
Vanilla, ground	2 oz.
Orris Root, powdered	3 lbs.
Oil Pimento	60 m
„ Bergamot	120 m
„ Geranium, French	60 m
„ Ylang-ylang	120 m
„ Rose	20 m
Extract, Musk	1 oz.
„ Civet	$\frac{1}{2}$ oz.
Benzoin, ground	1 oz.

10. *Violet Sachet.*

Orris Root, powdered	3 lb.
Oil Bergamot	30 m
„ Almonds, Bitter	20 m
„ Rose	20 m
Extract, Musk	1 oz.

11. *Rondeletia Sachet.*

Orris Root, powdered.	3 lbs.
Lavender Flowers, ground.	$1\frac{1}{2}$ lbs.
Oil Geranium, French	30 m
„ Bergamot	120 m
„ Cloves	120 m
„ Lavender, English	120 m
„ Rose	20 m
Musk Pods, grounds	1 oz.
Extract, Ambergris	1 oz.
Cloves, ground	$\frac{1}{2}$ oz.

12. *New-mown Hay Sack.*

Orris Root, powdered	. . . . .	4 lbs.
Tonka Beans, ground	. . . . .	$\frac{1}{2}$ lb.
Vanilla, ground	. . . . .	$\frac{1}{2}$ lb.
Oil Almonds	. . . . .	10 m
„ Geranium, French	. . . . .	120 m
„ Rose	. . . . .	30 m
„ Bergamot	. . . . .	60 m
Extract, Musk	. . . . .	1 $\frac{1}{2}$ oz.

Walnut Hair Dye. (From *National Druggist*.) The juice of the fresh walnut rind has been used from time immemorial as a hair dye. Bernschen and Semper have recently communicated to the Berlin Chemical Society a method of preserving it for use in the shape of a hydroglucoside, prepared as follows:—The rinds of the ripe nut are digested in sulphuric ether until their colouring matter is extracted. A solution of chromic acid in water is added to the ether solution, and the mixture thoroughly agitated. The ether is then distilled off, and the residue purified by solution, first in hot ether and afterward in a mixture of chloroform and petroleum ether, from which latter it is obtained in a crystalline form, as hydrogen glucoside. This substance colours the hair and skin exactly as does the juice of the fresh rind.

Moth Powder. (*Popular Science News*.) The following is recommended:—

	Parts.
Patchouly Herb	100
Valerian Root	50
Camphor	40
Orris Root	50
Sumbul Root	50
Patchouly Oil	1
Otto of Rose	1

The various ingredients are broken up, passed through a wide sieve to separate the coarser pieces, and freed from dust by a fine sieve. The oils are mixed with the orris-root, and all the ingredients are then combined.

Removing Mercurial Stains from Gold. B. Fischer. (*Pharm. Centralhalle*, 1885, xxvi. 187.) Mercury can be removed from gold articles by a wet process, consisting in rubbing them first with a paste composed of powdered iodine and alcohol, and then adding a concentrated solution of potassium iodide. The mercury iodide at first formed on the gold is dissolved by the potassium iodide solution. The gold is unacted upon at ordinary temperatures, and can afterwards be polished in the usual way.

An Enamel for Metals. (*Polyt. Notizbl.*, xl. 125.) A mixture of 12 parts borax, 20 parts soda, and 125 parts of flint glass is fused, poured on a cold plate, pulverized, and the powder mixed with a solution of soluble glass of 50° B. The metal is coated with this paste, and then heated gently in an oven until the coating is fused, and is then allowed to cool. It adheres firmly to all kinds of iron articles.

Cement for Connecting Ironwork. (From *Chemist and Druggist*.) 6 parts of sulphur, 6 of white lead, and 1 of borax, thoroughly mixed and wetted with strong sulphuric acid, make a strong cement for connecting ironwork.

Transparent Cement for Porcelain. (*Amer. Drugg.*, 1885, 157.) A formula recently recommended in the *Polyt. Notizbl.* is as follows:—Dissolve 76 parts of cut caoutchouc in 60 parts of chloroform, add 15 parts of mastic, and macerate in the cold until the whole is dissolved.

Artificial Gutta Percha. M. Zingler. (*Monthly Magazine of Pharmacy*.) 50 kilograms of copal resin and $7\frac{1}{2}$ –15 kilograms of pulverized sulphur are mixed with double the quantity of oil of turpentine, or with 55–66 litres of petroleum oil, in a tank which contains an agitator, and the mixture is then heated to a temperature which may vary from 122–150° C., the whole being stirred until complete solution is effected. The mass thus obtained is then cooled down to about 38°, and a solution of casein added, which contains about 3 kilograms of casein dissolved in weak ammonia water and a little methylated spirit. The whole is then again heated to between 122° and 150°, until it assumes a thin consistence, when it is caused to boil with a solution of tannic acid containing 15–25 per cent. of tannic acid, and about $\frac{1}{2}$ kilogram of ammonia.

Solubility of Caoutchouc. (From *Journ. Soc. Chem. Ind.*) Hanausek gives the following ratios of solubility of caoutchouc in different solvents:—

	Ceara.	Negro-head.	Sierra-Leone.
100 parts of Ethel Ether dissolve	2.5	3.6	4.5
100 " Oil of Turpentine dissolve . .	4.5	5.0	4.6
100 " Chloroform dissolve	3.0	3.7	3.0
100 " Petroleum Naphtha dissolve .	1.5	4.5	4.0
100 " Benzene dissolve	4.4	5.0	4.7
100 " Carbon Bisulphide dissolve . .	0.4	—	—

Oil of turpentine and benzene appear to be the best solvents.

Varnish for Labels. E. Dietrich. (From *Pharm. Centralhalle.*)

Sandarac	150 parts.
Mastic	50 „
Venice Turpentine	15 „
Alcohol	800 „

Macerate, with repeated stirring, until solution is effected. Then filter, and add enough

Alcohol to make	1000 parts.
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Paper labels are first sized with diluted mucilage, then dried, and then coated with this varnish. If the labels have been written with water-soluble inks or colour, they are first coated with two coats of collodion, and then varnished.

Soap for Cleaning Silver. (*Amer. Drugg., from Indep. Journ.*)

Jeweller's Rouge	$\frac{1}{2}$ lb.
Prepared Chalk	$\frac{3}{4}$ „

Mix.

Or,

Levigated Putty Powder	$\frac{1}{4}$ lb.
Burnt Hartshorn	$\frac{1}{2}$ „
Prepared Chalk	1 „
Rose Pink	1 oz.

Mix.

Or,

Fine Chalk	$\frac{1}{2}$ lb.
Pipeclay	3 ozs.
White Lead	2 „
Magnesia (Carbonate)	$\frac{3}{4}$ oz.
Jeweller's Rouge	$\frac{3}{4}$ „

Mix.

Silvering Paste. (*Amer. Drugg., from La Nature.*)

Nitrate of Silver	12 parts.
Common Salt	50 „
Cream of Tartar	30 „

Grind these three substances very finely in a mortar, then triturate with a little water to form a homogeneous paste; keep the paste sheltered from the light.

To silver, rub the copper or brass article with the paste, previously separating the verdigris from the copper, until it is thought that the layer of silvering is thick enough; then wash and wipe hard with a chamois skin. In replacing nitrate of silver by cyanide of silver, a dry powder is obtained, which is to be moistened when used. But it is more dangerous to use.

Powder for Cleaning Marble. (From *Chemist and Druggist*.)

Common Soda	.	.	.	.	.	2 lbs.
Powdered Pumice-stone	.	.	.	.	.	1 lb.
Finely powdered Chalk	.	.	.	.	.	1 „

Mix, and pass through a sieve. When required, moisten this powder with water, and rub the mixture well all over the marble, and allow it to remain on for some time; then wash the marble with soap and water, and it will be as clean as it was at first.

Improved Gum Solution. (*Chem. Centr.*, 1885, 418.) 2 grams of crystallized aluminium sulphate, dissolved in 20 grams of water, are added to 250 grams of strong gum arabic solution (2 grams in 5 grams of water). Ordinary solutions of gum arabic, however concentrated, fail in their adhesive power in many cases,—such as the joining together of wood, glass, or porcelain; prepared, however, according to the above receipt, the solution meets all requirements.

Gelatin Bottle-Capping. (*Amer. Journ. of Pharm.*, July, 1885, 337.) Soak 7 lbs of Russian gelatin in a mixture of 10 ounces of glycerin and 60 ounces of water, until it is thoroughly softened; then heat in a water-bath, to liquefy, and add a few drops of a watery solution of any aniline colour. The capping sets quickly, and should be used while hot.

A Blackening for Leather Articles. (*Journ. Soc. Chem. Ind.*, October, 1885, 602.) The following receipt gives a black which will take a good polish, and can be used for any kind of leather:—To 3 lbs. of boiling water are added $\frac{1}{2}$ lb. of white wax, 1 oz. transparent gelatin, 2 ozs. gum senegal, $1\frac{1}{2}$ oz. white soap, and 2 ozs. brown sugar; when the mixture is cold, $2\frac{1}{2}$ ozs. of alcohol and 3 ozs. of Frankfort black are added. It is applied to the leather with a soft brush, and when dry the leather is rubbed with pumice-stone, and finally polished.

Non-Acid Shoe Blacking. (From *Amer. Drugg.*) Mix thoroughly $\frac{3}{4}$ lb. lamp-black and $\frac{1}{2}$ lb. bone-black with 5 lbs. glycerin and 5 lbs. syrup. Heat moderately 3 ounces of gutta-percha, in an iron or copper vessel, until it is quite fluid. To this add 11 ounces olive oil, and after solution is complete a little over 1 ounce of stearin. This solution, while still warm, is added to the first mixture, after which $5\frac{1}{2}$ ounces gum senegal and $1\frac{1}{2}$ lb. of water are added. The whole is perfumed with about half an ounce of oil of rosemary, or oil of lavender. For use this blacking is mixed with 75 per cent of water. It is said to give a nice polish.

Indelible Inks. (*Amer. Journ. Pharm.*, 1886, 166, 167.) Rich-
mond states that indelible inks, which are not affected by acids, can
be made as follows :—

Dark Blue.—3 parts ferrocyanide of potassium, 2 parts concen-
trated aqua ammoniæ, 2 parts tartaric acid, and 240 parts of water
are mixed, the solution filtered, and 160 parts ammonio-citrate of
iron, 40 parts aqua ammoniæ, 8 parts aniline blue, and 70 parts of
gum arabic are added.

Black Ink is made by adding 20 parts of pyrogallie acid to the
above.

These inks, being non-corrosive, can be used with an ordinary
pen.

Copying Ink. (From *Amer. Drugg.*) The following formulæ are
recommended by Fehr :—

1.

Extract of Logwood	35 parts.
Vinegar, diluted (1 : 1)	1,000 „
Sulphate of Iron, cryst.	20 „
Alum	10 „
Gum Arabic	16 „
Sugar	32 „
Glycerin	2 „

Heat the extract of logwood with the diluted vinegar until
solution has been effected. Then allow to cool, and add the other
ingredients.

2.

Galls, ground	3 lbs.
Logwood, ground	2 lbs.
Sulphate of Iron, Cryst.	1 lb.
Gum Arabic	$\frac{3}{4}$ lb.
Vinegar	1 gal.
Water	2 $\frac{3}{4}$ gals.
Sugar	q. s.
Glycerin	q. s.

Macerate the solids with the vinegar and water for at least four
weeks, stirring and agitating the same several times daily. Then
draw off the ink from the insoluble matters, and add to each
gallon,—

Sugar	4 oz.
Glycerin	4 „

Essence of Vanilla for Flavouring. R. Rother. (*Amer. Journ.*
Pharm., October, 1885, 500–502.)

Vanillin, crystallized	. . .	3 drachms.
Coumarin, crystallized	. . .	1 drachm.
Caramel, liquid	. . .	2 fl. drachms.
Glycerin	. . .	4 fl. ounces.
Alcohol	. . .	2 pints.
Water, sufficient to make	. . .	1 gallon.

Dissolve the vanillin and coumarin in the alcohol, and add 4 pints of water. Mix the caramel and glycerin with 1 pint of water, and pour it into the first solution, together with enough more water to make the tincture measure 1 gallon, and filter it if necessary.

Preservative Salt for Meat. (*Rundschau*, 1885, 400.) Sodium chloride, 8; potassium nitrate, 1; salicylic acid, 1. Mix. To be rubbed on the meat, fish, etc. Before using the meat thus preserved wash repeatedly with cold water.

How to distinguish Oleomargarin from Genuine Butter. G. H. Ochse. (*Pharm. Rundschau*, xii. 325.) A piece of oleomargarin the size of a hazel-nut is placed in an epouvrette and the end made air-tight. Into another epouvrette a like quantity of butter is treated in the same way. When both epouvrettes are held in the hand, the oleomargarin soon liquefies, forming a clear solution; whilst butter requires double the time for solution, and when dissolved is not so clear as the oleomargarin solution. When the tube is filled one-third full with ether, the oleomargarin is easily dissolved, and does not produce any turbidity or precipitate on the addition of alcohol. Butter when treated in like manner yields a precipitate.

Kephyr. (*London Medical Record*, February 15, 1886.) Kephyr (ke'fyr, gypy, kehapy, kapyr) is prepared with cow's milk and a special ferment known as *Dispora caucasica*. This ferment was first described by E. Kern. It is a white, compact mass, elastic, covered with mucilage, resembling in aspect a cauliflower. It is found on mountains, below the snow line, on a certain kind of bush. The Russians call it gribki, signifying mushroom. The fungus (kephyr) consists of two parts—bacilli and yeast-cells; but the principal part is composed of bacilli; these give it its mucilaginous appearance and its elasticity. According to Kern, each cell contains two round spores, whence the name he has conferred on it, *Dispora caucasica*. Kephyr is an effervescing drink, always greatly esteemed from time immemorial by the natives. It is prepared by mixing 30 grams of the ferment with two glasses of milk from which the cream has been removed. The

next morning it is poured into another receptacle, more milk without cream is added to it, and it is then bottled. It is kept at a temperature of 10° or 12° R. (54.5° to 59° F.) for twenty-four hours, and often shaken. Fermentation takes place more rapidly when milk-sugar is added. Good kephyr is fluid, like oil, and pleasantly acid. The following table shows the comparative composition of kephyr and koumiss, and of milk, the basis of both—in 1,000 parts:—

	Milk.	Kephr.	Koumiss.
Albumen	48	38	11.2
Butter	38	20	20.5
Lactose	41	20	22
Lactic Acid	—	9	11.5
Alcohol	—	8	16.5
Water, Salts	873	904.9	918.3

Kephr is more agreeable than koumiss, and does not disturb the digestion; it is likewise cheaper. In order to succeed in preparing kephyr, the milk ought not to be too fat, nor the temperature too high nor too low during fermentation. Kephyr is an active analeptic; it is especially valuable in combination with iron for treating chlorosis, anæmia, and all affections of the respiratory organs. At the commencement of phthisis and dyspepsia, kephyr ought to be taken fasting—two glasses the first thing in the morning; later on, six, eight, or ten. Mandowski has found that it produces good effect in all kinds of dyspepsia, anæmia, catarrh of the stomach, chronic ulcer of the stomach, pulmonary catarrh, phthisis, and cancer. Pains in the stomach and vomiting were calmed in a few days by the use of kephyr. It stimulates the appetite and is highly nutritious. In itself it forms sufficient sustenance for a few days.

Marasquino di Zara. (*Amer. Journ. of Pharm.*, July, 1885, 337.)

Alcohol (90 per cent.)	2 litres.
Distilled Water	1½ "
Triple Orange-flower Water	80 grams.
Vanilla Tincture	20 "
Bitter Almond Water (concentrated)	30 "
Aromatic Tincture	10 "
Simple Syrup	900 "

The flavour depends upon the quantity of the ingredients used.

Escubac. (*Amer. Drugg.*, January, 1886, 9.) This French liquor is made as follows:—

℞ Saffron	4 ounces.
Juniper Berries	4 „
Dates	2 „
Raisins	2 „
Anise Seed.	1 drachm.
Coriander	1 „
Cinnamon	2 „
Mace.	1 „
Cloves	1 „
Diluted Alcohol.	10 pints.

Macerate for two weeks, and filter.

Improved Bengal Lights. (From *Amer. Drugg.*)

White.—I.

	Parts.
Potassium Nitrate	24
Washed Flowers of Sulphur	7
Arsenious Sulphide	2

II.

Potassium Nitrate	4
Flowers of Sulphur	2
Antimonious Sulphide	1

III.

Potassium Nitrate	16
Sublimed Sulphur	8
Flour	3

IV.

Potassium Nitrate	36
Sublimed Sulphur	7
Antimony	12

V.

Potassium Nitrate	8
Antimonius Sulphide	1.5
Washed Flowers of Sulphur	2.5

VI.

Potassium Nitrate	12
Washed Flowers of Sulphur	3
Antimony	2

White (Theatre Fire, poured out loose).

1.

Potassium Nitrate	72
Sublimed Sulphur	12
Antimonius Sulphide	12
Arsenic Disulphide	8
Shellac	1

II.

	Parts.
Potassium Nitrate	32
Sublimed Sulphur	8
Antimonius Sulphide	12
Red Lead	11

Yellow.—I.

Sodium Nitrate	24
Arsenious Sulphide	2
Sulphur	7
Antimony (crude)	2

II.

Potassium Nitrate	16
Sulphur	4
Flour	16
Amber	4
Pine Resin	3
Pitch	4

III.

Sodium Nitrate	6
Sulphur	1
Soot	1

Blue.—I.

Potassium Nitrate	16
Antimony (crude)	8
Zinc	7

II.

Ammoniacal Copper Sulphate	2
Potassium Chlorate	4
Sulphur	1

III.

Potassium Chlorate	3
Mountain Blue	1
Sulphur	1

Violet.—I.

Potassium Chlorate	49
Sulphur	25
Precipitated Calcium Carbonate	20
Black Oxide of Copper	6

Red.—I.

	Parts.
Potassium Chlorate	5
Strontium Nitrate	16
Arsenious Sulphide	1
Sulphur	2
Soot	1

II.

Potassium Nitrate	5
Sulphur	2
Antimony (regul.)	1

III.

Strontium Nitrate	20
Potassium Chlorate	2
Sulphur	5
Antimony (crude)	0.5
Charcoal	2

IV.

Strontium Nitrate	48
Flowers of Sulphur (washed)	9
Pulverized Charcoal	2
Potassium Chlorate	8

V.

Strontium Nitrate	5
Washed Flowers of Sulphur	15
Charcoal	0.5
Potassium Chlorate	6.5

Metallic Magnesium in Fireworks. (*Archiv der Pharm.* 1885, 714.) The addition of $2\frac{1}{2}$ per cent. of powdered magnesium entirely conceals the green flame produced by barium salts, giving them a bright white light, similar to the electric light; to the strontium flame it imparts an extraordinary brilliancy. The following formulas yield good results:

White Light.—Shellac, 1 part; nitrate of barium, 6 parts: add $2\frac{1}{2}$ per cent. powdered magnesium.

Red Fire.—Shellac, 1 part; nitrate of strontium, 5 parts: add $2\frac{1}{2}$ per cent. powdered magnesium.

The salts are mixed with shellac, the mass fused and powdered, then the magnesium is added.

Process for Purifying Vegetable Tannin Extracts. J. Dautreleau. (*Journ. Soc. Chem. Ind.*, December, 1885, 747.) The process consists in boiling the extract with a sulphite or hyposulphite—

preferably the hyposulphite—of alumina. A suitable proportion is 1 gram per litre of extract of 2° B.

Bleaching and Dyeing Bone and Ivory. R. Kayser. (*Dingl. polyt. Journ.*, clvii. 436.) The bleaching is effected by means of hydrogen peroxide. The goods to be treated are cleaned with benzene or ether, and placed in a bath of equal parts of hydrogen peroxide and water. The dyeing is carried out in the following manner:—

Having cleaned the goods as above, they are immersed in a solution containing 10 grams of hydrochloric acid in 1 litre of water for two minutes, after which they are taken out and washed. For red, 10 grams of magenta or rubine are dissolved in 3 litres of water, and treated with 100 grams of acetic acid. The goods are then placed into this solution at a temperature of 50°. After half an hour's digestion they are taken out and washed, and dried at a gentle heat.

The following solutions may be used under similar conditions:—

For red: 5 grams of eosin, erythrosin, eosin-scarlet, phloxine, "rose Bengale," or "erythrine" dissolved in 1 litre of water and treated with 2 grams of tartaric acid. For violet: 5 grams of methyl-violet or dahlia, dissolved in 1 litre of water and 3 grams of tartaric acid. For blue: 2 grams of methylene-blue or navy-blue. For green: 3 grams of new Victoria green or brilliant green, dissolved in two litres of water and 100 grams of acetic acid. For yellow: 8 grams of naphthol-yellow S., or fast yellow, dissolved in 2 litres of water and 300 grams of acetic acid. For black: 30 grams of soluble nigrosin, dissolved in 2 litres of water and treated with 300 grams of acetic acid.

Application of Chromium Chlorate in Cotton Printing. E. Lauber and C. Weinreb. (*Dingl. polyt. Journ.*, clvii. 290.) In 1877, Storek and De Conink recommended the use of chromium chlorate in cotton printing: but from a number of causes, especially the cost of production, the application of this compound has been limited. Storek produced his chlorate in the printing colour by mixing chrome-alum with barium chlorate, whereby a large proportion of the latter was consumed in converting the potassium sulphate of the chrome-alum into potassium chlorate,—a reaction of no value as regards the conversion of chromium chlorate into chromic acid.

Some time ago one of the authors succeeded in preparing chromium-chlorate more cheaply, on a large scale, by precipitating a solution of 60 kilos. of chrome-alum in 80 litres of hot water,

with 20 kilos. of ammonia soda dissolved in 60 litres of water, well washing the precipitate, and dissolving it in 10 kilos. of cold sulphuric acid of 66° B. After filtration, the solution is treated with 22 kilos. potassium chlorate, dissolved in 50 litres of water. Potassium sulphate crystallizes out, the mother-liquor containing chromium chlorate. The chlorate thus obtained is available for use in printing, and gives a good steam catechu or steam chrome-brown, but does not yield a good logwood black. It appears that oxidation alone is insufficient for the fixation of hæmatoxylin, and that the development of the black colour requires the presence of a metallic oxide.

A number of receipts for printing with chromium acetate, as prepared by the authors, are given at the end of the paper.

Tannin Method of Fixing Colouring Matters on Cotton. O. N. Witt. (*Chemical News*, li. 217, 218.) Basic aniline dyes are generally fixed on cotton by the formation upon the fibre of insoluble tannin compounds—tannin lakes. To precipitate the dyes completely, it is necessary to use in addition to the tannin, sodium carbonate, or other base, to combine with the acid set free from the colouring matter. Most basic colours are polybasic, forming several tannates, and insoluble tannates when treated with tannin solutions unite with more tannin and become soluble. Therefore, the fabric must be first saturated with the required quantity of tannin solution, and then dyed in the colour. As tannin-lakes are soluble in acetic acid, cloth is printed with a mixture of tannin and colour in the proper proportions, with acetic acid, gum or starch to thicken, and sodium acetate to take up any liberated acid. On steaming the acetic acid dissolves the lake, enabling it to penetrate the material, volatilises, and leaves the coloured lake insoluble upon the fibres. There may, however, readily be excess of tannin on the fibre, consequently during washing a portion of the lake is dissolved by this excess, and the colour is reprecipitated by the lime of the water on the whites and other colours. Many substances have been suggested to render the excess of tannin harmless, but none have succeeded so well as antimony. In dyeing, a bath of potassium antimony tartrate, or better still oxalate, is introduced between the tannin and colour-bath; in printing, the printed and steamed pieces are passed into the hot antimony bath. After the antimony treatment, thorough washing is necessary. The antimony first forms an insoluble tannate, hence renders the tannin harmless; it subsequently enters into the fixed colours, forming antimony-tannin lakes, which are not readily soluble.

From the removal of antimony in the colour on the fabric, the antimony bath gradually becomes more and more charged with hydrogen potassium tartrate or oxalate, and ultimately the tartrate, owing to its solvent action, becomes more injurious to the dyed fabric than the excess of tannin itself; the hydrogen potassium oxalate, on the other hand, is not such a good solvent for the antimony-tannin lakes, and therefore potassium antimony oxalate is recommended to supersede the corresponding tartrate in antimony-lakes.

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A *Manual of Weights, Measures, and Specific Gravity*, including principles of metrology; the weights and measures now in use; weight and volume, and their reciprocal relations; weighing and measuring; balances (scales) and weights; measures of capacity; specific weight and specific volume, and their determination and practical applications; with rules and tables. By *Oscar Oldberg*, Pharm.D., Professor of Pharmacy and Director of the Pharmaceutical Laboratory of the Chicago College of Pharmacy. Chicago: Published by the Author. 1885. 8vo, pp. 238.

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TRANSACTIONS
OF THE
British Pharmaceutical Conference
AT THE
TWENTY-THIRD ANNUAL MEETING
AT
BIRMINGHAM,
1886.

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British Pharmaceutical Conference.

CONSTITUTION.

Art. I.—This Association shall be called The British Pharmaceutical Conference, and its objects shall be the following :—

1. To hold an annual Conference of those engaged in the practice, or interested in the advancement, of Pharmacy, with the view of promoting their friendly reunion, and increasing their facilities for the cultivation of Pharmaceutical Science.
2. To determine what questions in Pharmaceutical Science require investigation, and when practicable, to allot them to individuals or committees to report thereon.
3. To maintain uncompromisingly the principle of purity in Medicine.
4. To form a bond of union amongst the various associations established for the advancement of Pharmacy, by receiving from them delegates to the annual Conference.

Art. II.—Membership in the Conference shall not be considered as conferring any guarantee of professional competency.

RULES.

1. Any person desiring to become a member of the Conference shall be nominated in writing by a member, and be balloted for at a general meeting of the members, two-thirds of the votes given being needful for his election. If the application be made during the recess, the Executive Committee may elect the candidate by a unanimous vote.

2. The subscription shall be 7s. 6d. annually, which shall be due in advance upon July 1.

3. Any member whose subscription shall be more than two years in arrear, after written application, shall be liable to be removed from the list by the Executive Committee. Members may be expelled for improper conduct by a majority of three-fourths of those voting at a general meeting, provided that fourteen days' notice of such intention of expulsion has been sent by the Secretaries to each member of the Conference.

4. Every association established for the advancement of Pharmacy shall, during its recognition by the Conference, be entitled to send delegates to the annual meeting.

5. The Officers of the Conference shall be a President, four Vice-presidents by election, the past Presidents (who shall be Vice-presidents), a Treasurer, two General Secretaries, one local Secretary, and nine other members, who shall collectively constitute the Executive Committee. Three members of the Executive Committee to retire annually by ballot, the remainder being eligible for re-election. They shall be elected at each annual meeting, by ballot of those present.

6. At each Conference it shall be determined at what place and time to hold that of the next year.

7. Two members shall be elected by the Conference to audit the Treasurer's accounts, such audited accounts to be presented annually.

8. The Executive Committee shall present a report of proceedings annually.

9. These rules shall not be altered except at an annual meeting of the members.

10. Reports on subjects entrusted to individuals or committees for investigation shall be presented to a future meeting of the Conference, whose property they shall become. All reports shall be presented to the Executive Committee at least fourteen days before the annual meeting.

. Authors are specially requested to send the titles of their Papers to The Hon. Gen. Secs. Brit. Pharm. Conf., 17, Bloomsbury Square, London, W.C., two or three weeks before the Annual Meeting. The subjects will then be extensively advertised, and thus full interest will be secured.

FORM OF NOMINATION.

I Nominate

(Name) _____

(Address) _____

as a Member of the British Pharmaceutical Conference.

Member.

Date _____

This or any similar form must be filled up legibly, and forwarded to The Secretary, Brit. Pharm. Conf., 17, Bloomsbury Square, London, W.C., who will obtain the necessary signature to the paper.

Pupils and Assistants, as well as Principals, are invited to become members.

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 Southall, Mr. Winfred, Sir Harry's Road, Edgbaston, Birmingham.
 Southwell, Mr. C. H., Boston.
 Sowray, Mr. J., Petergate, York.
 Sowray, Mr. R. D., 58, Sandy Lane, Skelmersdale.
 Spearing, Mr. J., 53, Above Bar, Southampton.
 Spence, Mr. J., 1, Mounthooly, Aberdeen, N.B.
 Spencer, Mr. T., London House, South Street, Sleaford, Lincs.
 Spencer, Mr. T., Wokingham.
 Spilsbury, Mr. J., 33, Bath Street, Leamington.
 Spinney, Mr. F., 14, Commercial Road, Bournemouth.
 Sprackett, Mr. W., 58, Quayside, Bristol.
 Spyer, Mr. N., 1, Lancaster Gate, Hyde Park, W.
 Squire, Mr. A., 1, Bush Lane, E.C.
 Squire, P. W., F.L.S., F.C.S., 413, Oxford Street, W.
 Stable, Mr. R. H., 92, Drayton Park, Highbury, N.
 Stacey, H. G., F.C.S., 300, High Holborn, W.C.
 Stacey, Mr. S. Ll., 300, High Holborn, W.C.
 Stafford, Mr. W., 10, Northgate Street, Gloucester.
 Stainer, Mr. J., 59, Sandgate Road, Folkestone.
 Stammwitz, Miss L., 42, Askew Road, Uxbridge Road, W.
 Stamp, Mr. E. B., High Street, Hampstead, N.W.
 Stanford, E. C. C., F.C.S., Glenwood, Dalmuir, Glasgow.
 Stangroom, Mr. A., Whissonsett, near Dereham, Norfolk.
 Stanley, Mr. H., 72, The Parade, Leamington.
 Stanley, Mr. T., Whalley Road, Accrington.
 Stansfield, Mr. R., 85, Haverstock Hill, N.W.
 Stanswood, Mr. J., 277, Commercial Road, Landport.
 Stanway, Mr. W. H., Kington, Herefordshire.
 Staples, Mr. E., West Street, Wilton.
 Stapleton, Mr. J., 3, Lower Sackville Street, Dublin.
 Starkie, Mr. R. S., 126, Strand, W.C.
 St. Dalmas, Mr. A., 40, Belgrave Gate, Leicester.
 Steedman, Mr. R. H., Holly Villa, Dalmuir, N.B.
 Stedman, Mr. W., 76, High Street, Ashford, Kent.
 Stenson, Mr. J., 116, High Street, Camden Town, N.W.
 Stephen, Mr. J. W., 38, Duff Street, Macduff, Banffshire.
 Stephenson, Mr. F., 16, Howe Street, Edinburgh.
 Stephenson, Mr. J. B., 48, Frederick Street, Edinburgh.
 Stephenson, Mr. J. N., High Street, Heckmondwike.
 Stephenson, S., F.C.S., Llyn-y-mawn, Holywell, Flintshire.
 Stevens, Mr. P. A., 72, Mansfield Road, N.W.
 Stevenson, Mr. J. C., The Strand, Todmorden.
 Stevenson, Mr. J., 1, Baxtergate, Whitby.
 Stevenson, Mr. R. W., 19, Victoria Street, Derby.
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 Storie, Mr. R., Dalkeith, N.B.
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 Sykes, Mr. T. H., Church Street, Southport.
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 Hampstead, N.W.

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 Tame, Mr. T. W., 19, Moor Street, Chepstow.
 Tamplin, Mr. E. C., Kingston-on-Thames.
 Tanner, Mr. A. E., Tottenham High Cross, E.
 Taplin, Mr. W. G., 91, Hampstead Road, N.W.
 Tate, Mr. J. L. Address unknown.
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 Taylor, G. S., F.C.S., 13, Queen's Terrace, St. John's Wood, N.W.
 Taylor, Mr. J., 13, Baker Street, W.
 Taylor, Mr. John, The Belgrave Pharmacy, Torquay.
 Taylor, Mr. J. B., 19, High Street, Bedford.
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 Taylor, Mr. W. G., Charford Mill, Bromsgrove.
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 Thomas, Mr. H., St. Leonards-on-Sea.
 Thomas, Mr. H. J., Landore, Swansea.
 Thomas, Mr. J., Bridge, Canterbury, Kent.
 Thomas, Mr. J. D. D., 144, Ashley Road, Bristol.
 Thomas, Mr. J. E., 2, Christina Street, Swansea.
 Thomas, Mr. J. P., 5, Great Dark Street, Aberystwyth.
 Thomas, Mr. R., 143, High Street, Merthyr.
 Thomas, Mr. T. R., Burry Port.
 Thomas, Mr. W., Builth, Breconshire.
 Thomas, Mr. W. J., 9, Commercial Place, Aberdare.
 Thompson, Mr. A., 51, English Street, Carlisle.

- Thompson, Mr. A., 146, Upper Richmond Road, Putney, S.W.
 Thompson, Mr. C., Stratford Road, Sparkbrook, Birmingham.
 Thompson, Mr. C. T. S., Lodge Lane, Princes Park, Liverpool.
 Thompson, Mr. G., Alston.
 Thompson, Mr. H., 101, Southwark Street, S.E.
 Thompson, Mr. H. A., 22, Worship Street, Finsbury Square, E.C.
 Thompson, Mr. H. C., 153, Lodge Lane, Liverpool.
 Thompson, Mr. J., 11, Aldersgate Street, E.C.
 Thompson, Mr. J., 58, Hanover Street, Liverpool.
 Thompson, Mr. J., High Street, Knaresboro', Yorkshire.
 Thompson, Mr. J. S., Sutton Coldfield, near Birmingham.
 Thompson, Mr. L., Lisnaskea, Ireland.
 Thompson, Mr. M. F., 17, Gordon Street, Glasgow.
 Thompson, Mr. T., 35, George Street, Edinburgh.
 Thompson, Mr. T., Finkle Street, Richmond, Yorks.
 Thomson, Mr. C., Elie, Fife.
 Thomson, W., F.I.C., F.R.S.E., Royal Institution, Manchester.
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 Thwaites, Mr. F., Albert Hill, Bishop Auckland.
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 Tilsley, Mr. R., Caersws R.S.O., Montgomery.
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 Tipton, Mr. St. J., St. George's, Wellington, Salop.
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 Townson, Mr. W., 2, Russell Street, Liverpool.
 Towther, Mr. T., The Manor House, Moseley, Birmingham.
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 Troake, Mr. W. H., Kingsbridge, Devon.
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 Troughton, Mr. C., 72, Old Hall Street, Liverpool.
 Truman, Mr. H. V., Thames Street, Sunbury.
 Tucker, Mr. H. S., 139, Great Hampton Row, Birmingham.
 Tudor, Mr. W. P., Priory Villa, Brecon.
 Tullett, Mr. T. W., 86, Main Street, Sparkbrook, Birmingham.
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- Turnbull, Mr. H. J., Tavistock Place, Sunderland.
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 Turner, Mr. C. E., 20, Bury Street, Great Russell Street, W.C.
 Turner, H., M.R.C.S., 1, Spotland Road, Rochdale.
 Turner, Mr. J., Chemical Works, Queen's Ferry, Flintshire.
 Turner, Mr. J., 15, Fore Street, Hexham.
 Turner, Mr. J., 16, Market Square, Aylesbury.
 Turner, Mr. J., 118, Princess Buildings, The Moor, Sheffield.
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 Turner, Mr. R., Oundle, Northamptonshire.
 Turner, Mr. W. S., 225, Oxford Street, Manchester.
 Turton, Mr. Wm., 93 & 95, St. Peter's Street, Leeds.
 Turney, Mr. S. B., 183, Union Street, Plymouth.
 Tutton, Mr. J., 7, Lower Hillgate, Stockport.
 Twemlow, Mr. R., 91, Upper Brook Street, Manchester.
 Twiss, Mr. W., Hunstanton, Norfolk.
 Tyler, Mr. T., Comberton Hill, Kidderminster.
 Tyrer, Mr. P., 70, Long Lane, Borough, S.E.
 Tyrer, T., F.I.C., F.C.S., Garden Wharf, Battersea, S.W.
 Umney, C., F.I.C., F.C.S., 50, Southwark Street, S.E.
 Umney, Mr. J. C., Eardley House, Laurie Park, Sydenham, S.E.
 Upton, Mr. E. J., Wallingford, Berks.
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 Vennall, Mr. G., Cranleigh, Guildford.
 Vincent, Mr. P., jun., Walham Green, S.W.
 Vinco, Mr. J., 37, Cheapside, Lancaster.
 Virgo, Mr. C., The Foregate, Worcester.
 Voce, Mr. W. G., 52, Halesowen Road, Netherton, near Dudley.
 Waddington, Mr. H., Market Street, Thornton, near Bradford.
 Wakefield, Mr. C. H., Blackmore House, Malvern Wells.
 Wakefield, Mr. T., Six Ways, Brookfields, Birmingham.
 Wakeham, Mr. C., Helston.
 Wales, Mr. J. C., Hemsworth, Yorkshire.
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 Walker, J. F., M.A., F.I.C., F.C.S., 16, Gilligate, York.
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 Walton, Mr. R., High Street, Maidenhead.
 Wand, Mr. S., Haymarket, Leicester.
 Ward, G., F.I.C., F.C.S., 39, Aire Street, Leeds.
 Ward, Mr. J., 39, Eastgate Street, Gloucester.
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 Ward, W., F.C.S., Sheffield Moor, Sheffield.
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 Waterall, Mr. G. E., Chapel Bar, Nottingham.
 Watkinson, Mr. J. W., Market Street, Farnworth, Bolton.
 Watson, Mr. J. E. H., Rose Corner, Norwich.
 Watson, Mr. M., 3, Summerhill Street, Newcastle-on-Tyne.
 Watson, Mr. S., 176, High Street, Hounslow.
 Watson, Mr. T. D., F.C.S., 23, Cross Street, Finsbury, E.C.
 Watts, Mr. J., Dudley Hill, Bradford, Yorks.
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 Webb, Mr. R. C., Medical Hall, Wexford.

- Weld, Mr. C. C., Messrs. Burroughs, Willcome & Co., Snow Hill Buildings, Holborn Viaduct, E.C.
- Wellcome, Mr. H. S., 7, Snow Hill, Holborn Viaduct, E.C.
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- West, Mr. T., 61, Chester Road, Stretford, Manchester.
- West, Mr. W., 15, Horton Lane, Bradford.
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- Weston, Mr. C., 2, High Street, Ventnor, Isle of Wight.
- Weston, Mr. S. J., 151, Westbourne Terrace, W.
- Westrup, Mr. J. B., 76, Kensington Park Road, W.
- Wheeldon, Mr. J., 241, Stockport Road, Manchester.
- Wheeldon, Mr. W. H., High Street, Knighton, Radnorshire.
- Wheeler, Mr. C., 143, Hackney Road, E.
- Wheeler, Mr. J. W., 52, Chaucer Road, Herne Hill, S.E.
- White, Mr. E. A., Mayfield, Sussex.
- White, Mr. G., 115, Hall Street, Dudley.
- White, Mr. J. F., 13, Blenheim Terrace, Leeds.
- Whitfield, J., F.C.S., 113, Westborough, Scarborough.
- Whitla, Mr. M. R., Medical Hall, Monaghan.
- Whitla, W., M.D., L.A.H., College Square North, Belfast.
- Whitmore, Mr. W. T., 7, Arlington Street, Piccadilly, S.W.
- Whitrow, Mr. B., 15, St. John's Road, Tunbridge Wells.
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- Whittle, Mr. S., Leigh, Lancashire.
- Whittles, Mr. H., 44, Wheeler Street, Lozells, Birmingham.
- Whitworth, Mr. J., 88, Portland Street, Southport.
- Whysall, Mr. W., Grantham.
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- Wiggins, Mr. H., 236, Southwark Park Road, Bermondsey, S.E.
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- Wild, Mr. J., Clarendon Place, Hyde, Cheshire.
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- Wilkinson, Mr. G., 267, Waterloo Road, Manchester.
- Wilkinson, Mr. T., 270, Regent Street, W.
- Wilkinson, Mr. W., 51, Lambeth Walk, S.E.
- Wilkinson, Mr. W., 263, Cheetham Hill, Manchester.
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- Willan, Mr. W., 3, Friargate, Preston, Lancs.
- Wiley, Mr. W., New Cleve, Grimsby.
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- Williams, Mr. E., Cerrig-y-Druoidion, Denbighshire.
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- Williams, Mr. H., 9, Bull Ring, Birmingham.
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- Williams, Mr. J. D., Turret House, Bodmin, Cornwall.
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- Williams, Mr. W., 265, Crown Street, Liverpool.

- Williams, Mr. W., 80, Upper Street, Islington, N.
 Williams, Mr. W. J., 123, Cannon Street, E.C.
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 Willmott, Mr. W. Address unknown.
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 Wilson, Mr. E., Silverdale, Staffordshire.
 Wilson, Mr. J., General Infirmary, Derby.
 Wilson, Mr. J., Penrith, Cumberland.
 Wilson, Mr. J., 11, George Street, Bath.
 Wilson, Mr. J. H., 6, West Park, Harrogate.
 Wilson, Mr. James Milton, 16, Leven Street, Edinburgh.
 Wilson, Mr. T., Stowmarket.
 Wilson, Mr. T. W., Bootham, York.
 Wing, Mr. G. N., Melton Mowbray.
 Wing, Mr. Lewis, Chislehurst, W. Kent.
 Wink, Mr. J. A., 2, Devonshire Square, Bishopsgate Street, E.C.
 Wise, Mr. J. N., 14 & 15, Claypath, Durham.
 Wood, Mr. A., New Brentford.
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 Wood, Mr. R., 50, High Street, Windsor.
 Wood, Mr. R., 25, Mill Street, Macclesfield.
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 Woolley, Mr. G. S., 69, Market Street, Manchester.
 Woolley, Mr. Harold, 69, Market Street, Manchester.
 Woolley, Mr. Hermann, Knowsley Street, Cheetham, Manchester.
 Woolrich, Mr. C. B., Uttoxeter, Staffs.
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 Wootton, Mr. P., Market Place, Luton, Beds.
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 Wyley, Mr. W. F., Hertford Street, Coventry.
 Wylie, Mr. D. N., 1, South College Street, Edinburgh.
 Wyman, Mr. J., Charles Street, Farringdon Road, E.C.
 Wynne, Mr. E. P., 7, Pier Street, Aberystwith.
 Yates, Mr. D., 32, Darwen Street, Blackburn.
 Yates, Mr. F., 64, Park Street, Southwark, S.E.
 Yates, Mr. G. A., Birch Villa, Lees, via Oldham.
 Yates, Mr. R., 64, Park Street, Southwark, S.E.
 Yeomans, Mr. J., 22, Petty Cury, Cambridge.
 Yorath, Mr. T. V., Canton, Llandaff.
 Young, Mr. J., 20, High Street, Newport, Mon.
 Young, Mr. J., Folds Road, Bolton.
 Young, Mr. J., Elgin.

Young, J. R., F.C.S., Sankey Street, Warrington.

Young, Mr. J. R., 17, North Bridge, Edinburgh.

Young, Mr. R. F., New Barnet.

NOTICE.

*Members are requested to report any inaccuracies in these lists
by letter, addressed as follows:—*

THE SECRETARY,

BRIT. PHARM. CONF.,

17, Bloomsbury Square,

London, W.C.

SOCIETIES AND ASSOCIATIONS

INVITED TO SEND DELEGATES TO THE ANNUAL MEETING.

The Pharmaceutical Society of Great Britain.

The North British Branch of the Pharmaceutical Society of Great Britain.

The Pharmaceutical Society of Ireland.

ABERDEEN.—Society of Chemists and Druggists (1839). Mr. A. Strachan, 138, Rosemount Place, Aberdeen.

ABERROATH.—Chemists' Association (1874). Mr. D. A. Cargill.

ASHTON-UNDER-LYNE.—Ashton-under-Lyne and Dunkinfield Chemists' Association (1869). Mr. E. Fisher, 106, Stamford Street, Ashton-under-Lyne.

BIRMINGHAM.—Midland Counties Chemists' Association (1869). Mr. S. Dewson, 90, New Street, Birmingham. Chemists' Assistants' Association (1868), Birmingham.

BRIGHTON.—Association of Pharmacy (1861). Mr. Marshall Leigh, 46, Dyke Road, Brighton.

BRISTOL.—Pharmaceutical Association (re-established 1869). G. F. Schacht, F.C.S., 7, Regent Street, Clifton, Bristol.

COLCHESTER.—Association of Chemists and Druggists (1845). Mr. W. B. Cordley, Colchester.

COVENTRY.—Coventry and Warwickshire Pharmaceutical Association (1877). Messrs. Wyleys & Co., Coventry.

DOVER.—Chemists' Association.

DUNDEE.—Chemists and Druggists' Association (1868). Mr. J. Russell, Dundee.

EDINBURGH.—Chemists' Assistants' Association. Mr. J. R. Hill.

EXETER.—Exeter Pharmaceutical Society (1845). Mr. G. Pasmore, Exeter.

GLASGOW.—Chemists and Druggists' Association (1854). Mr. J. Arnot, 34, Virginia Street, Glasgow.

HALIFAX.—Halifax and District Chemists and Druggists' Association (1868). Mr. J. B. Brierley, Halifax.

HASTINGS.—Chemists' Association (1884). Mr. A. N. Beck, 11, York Buildings, Hastings.

HAWICK.—Pharmaceutical Association. Mr. Thomas Maben, 5, Oliver Place, Hawick.

HULL.—Chemists' Association (1868). Mr. C. B. Bell, 6, Spring Bank, Hull.

LEEDS.—Chemists' Association (1862). Mr. J. Hellowell, 88, West Street, Leeds.

LEICESTER.—Leicester and Leicestershire Chemists' Association. Mr. J. J. Edwards, The Newarke, Leicester.

LINCOLN.—Chemists' Association. Mr. C. F. Gadd, 200, High Street, Lincoln.

LIVERPOOL.—Chemists' Association (1868). A. H. Samuel, F.C.S., 145, Upper Parliament Street, Liverpool.

LONDON.—Chemists' Assistants' Association. Messrs. W. Rushton and J. E. Saul, 143, New Bond Street, W.

MANCHESTER.—Chemists and Druggists' Association (1853). F. B. Bengier, F.C.S., 7, Exchange Street, Manchester.

NOTTINGHAM.—Nottingham and Notts Chemists' Association (1863). Mr. C. A. Bolton, 40, Carlton Street, Nottingham.

OLDHAM.—Chemists' Assistants and Apprentices' Association (1870). Mr. C. G. Wood, Secretary, Church Institute.

PLYMOUTH.—Association of Chemists for Plymouth, Devonport, and Stonehouse (1868). Mr. G. Breeze, Catherine Street, Devonport.

PRESTON.—Pharmaceutical Students' Society. Mr. H. Denham, 8, Regent Street, Preston.

SCARBOROUGH.—Chemists' Association (1870). J. Whitfield, F.C.S., Scarborough.

SHEFFIELD.—Pharmaceutical and Chemical Society (1869). Mr. G. T. W. News-holme, 74, Market Place, Sheffield.

SUNDERLAND.—Chemists' Association (1869). Mr. J. Harrison, 33, Bridge Street, Sunderland.

TAUNTON.—Chemists' Association (1870). Mr. H. Prince, Fore Street, Taunton.

YORK.—Chemists' Association (1865). Mr. Montague Folkard, 9, High Ousegate, York.

PRESENTATION COPIES OF THE YEAR-BOOK OF PHARMACY ARE
FORWARDED TO THE FOLLOWING :—

The Honorary Members.

Libraries.

American Pharmaceutical Association; Chemical Society of London; Ecole de Pharmacie, Montpellier; Ecole Supérieure de Pharmacie, Paris; Massachusetts College of Pharmacy; The Mason College, Birmingham; Missouri College of Pharmacy; New Zealand Board of Pharmacy; North British Branch of the Pharmaceutical Society; Pharmaceutical Society of Great Britain; Pharmaceutical Society of Ireland; Pharmaceutical Society of New South Wales; Ontario College of Pharmacy, Toronto; Pharmaceutical Society of Australasia; Royal Society of London; Société de Pharmacie, Paris; State of Illinois Board of Pharmacy; Yorkshire College of Science.

Provincial Associations (having Libraries).

Aberdeen Society of Chemists and Druggists; Arbroath Chemists' Association; Brighton Chemists' Association; Bristol Pharmaceutical Association; Colchester Association of Chemists and Druggists; Coventry and Warwickshire Pharmaceutical Association; Exeter Pharmaceutical Society; Glasgow Chemists and Druggists' Association; Halifax and District Chemists and Druggists' Association; Hastings Chemists' Association; Hawick Chemists' Association; Hull Chemists' Association; Leeds Chemists' Association; Leicester Chemists' Assistants and Apprentices' Association; Liverpool Chemists' Association; Manchester Chemists and Druggists' Association; Midland Counties Chemists' Association; Nottingham and Notts Chemists' Association; Oldham Chemists and Druggists' Assistants and Apprentices' Association; Sheffield Pharmaceutical and Chemical Association; Sunderland Chemists' Association; York Chemists' Association.

Journals.

American Druggist; American Journal of Pharmacy; Archiv der Pharmacie; British Medical Journal; Canadian Pharmaceutical Journal; Chemical News; Chemist and Druggist; Journal de Pharmacie d'Anvers; Journal de Pharmacie et de Chimie; Lancet; Medical Press and Circular; The Microscope; Nature; Pharmaceutical Journal; Pharmaceutische Centralhalle; Pharmacist; Répertoire de Pharmacie; Revista Farmaceutica.

THE FOLLOWING JOURNALS ARE RECEIVED FROM THEIR RESPECTIVE EDITORS :—

American Druggist; American Journal of Pharmacy; Archives de Pharmacie; Archiv der Pharmacie; British Medical Journal; Canadian Pharmaceutical Journal; Chemical News; Chemist and Druggist; Journal de Pharmacie d'Anvers; Journal de Pharmacie et de Chimie; Pharmaceutical Journal; Pharmaceutical Record; Pharmaceutische Centralhalle; Pharmacist; Proceedings of the American Pharmaceutical Association; Répertoire de Pharmacie; Revista Farmaceutica.

PROGRAMME OF THE PROCEEDINGS

OF THE

BRITISH PHARMACEUTICAL CONFERENCE

AT THE

TWENTY-THIRD ANNUAL MEETING, BIRMINGHAM, 1886.

OFFICERS.

President. T. GREENISH, F.C.S., F.R.M.S.

Vice-Presidents.

(Who have filled the office of President.)

PROF. BENTLEY, F.L.S., M.R.C.S., London.
H. B. BRADY, F.R.S., F.L.S., F.C.S., New-
castle-on-Tyne.
THOS. B. GROVES, F.C.S., Weymouth.
PROF. REDWOOD, Ph.D., F.I.C., F.C.S.,
London.

G. F. SCHACHT, F.C.S., Clifton, Bristol.
R. REYNOLDS, F.C.S., Leeds.
PROF. ATTFIELD, Ph.D., F.R.S., F.I.C.,
F.C.S., London.
J. WILLIAMS, F.I.C., F.C.S., London.
J. B. STEPHENSON, Edinburgh.

Vice-Presidents.

T. BARCLAY, Birmingham.
F. B. BENDER, F.C.S., Manchester.

M. CARTEIGHE, F.I.C., F.C.S., London.
C. EKin, F.C.S., London.

Treasurer. C. UMNEY, F.I.C., F.C.S., London.

Honorary General Secretaries.

SIDNEY PLOWMAN, F.R.C.S., London. | JOHN C. THRESH, D.Sc., F.C.S., Buxton

Local Secretary. C. THOMPSON, Birmingham.

Other Members of the Executive Committee.

ATKINS, S. R., Salisbury.
BRUNER, J. E., M.A., Dublin.
DOTT, D. B., F.R.S.E., Edinburgh.
HILLS, W., F.C.S., London.
KAY, J. P., Aberdeen.

MABEN, T., Hawick.
NAYLOR, W. A. H., F.C.S., London.
PERRY, G. E., Birmingham.
SYMONS, W. H., F.C.S., F.R.M.S., London.

Auditors.

J. PATERSON, Aberdeen.

C. J. ARBLASTER, Birmingham

Editor of Year-Book.

LOUIS SIEBOLD, F.I.C., F.C.S.

Secretary.

PHILIP PRINCEP

Local Committee.

ADAMS, WILLIAM, Shrewsbury.
ADOCK, F. H., F.C.S., *Assistant*
Secretary, Birmingham.
ALKINS, T. R., Tainworth.
ALEXOP, J., Oldbury.
ARBLASTER, CHAS. J., Birmingham.
ASTON, J. J., Birmingham.
AUSTIN, A., Malvern.
AVERILL, T. and H. A., Stafford.
BAGOTT, Alderman Geo., Dudley.
BALL, GEO. V., Banbury. [ham]
BARCLAY, THOS., *Chairman*, Birmingham.
BARLOW, FRED., Birmingham.
BARNITT, JNO., Leamington.
BARNETT, J. T., Leamington.
BARTON, H. E., Kenilworth.
BATES, JAMES, Wellington, Salop.
BELLAMY, J., Birmingham.
BIRD, ALFRED, Birmingham.
BLACKWELL, J., Birmingham.
BLAND, T. F., F.C.S., Stourbridge.
BLUNT, T. P., M.A., F.C.S., Shrewsbury.
BRASSINGTON, W. R., Birmingham.
BULLUS, JNO., West Bromwich.
BURTON, W., Harborne.
BUTCHER, THOS., Cheltenham.
CHAMBERLAIN, A. G., Rugby.
CHARRINGTON, W., Lichfield.
CHASE, T., Birmingham.
CHURCHILL, W. J., Birmingham.

CLARIDGE, F., Watwick.
CLARKE, H. R. S., Malvern.
CLAYTON, F. C., F.C.S., Birmingham.
COLWELL, D. B., Malvern.
CORRETT, W., Bromsgrove.
CORFIELD, E., Birmingham.
CROOKE, CHAS. G., Birmingham.
CROSS, W. G., Shrewsbury.
DAVIS, H., Leamington.
DEWSON, STOKES, Birmingham.
EYNSON, D. J., Leamington.
FERMING, W., Wolverhampton.
FROST, GEO., Derby.
GABEAD, CHAS., Leamington.
GIBBS, R. D., Wednesbury.
GIBSON, F. T., Birmingham.
GITTOES, S. J., Wednesbury.
GREEN, I., Tutbury.
HARRIS, STEPHEN, Droitwich.
HAWKES, R., J. P., Stratford-on-Avon.
HAYDON, W. F., F.C.S., Birmingham.
HEELEY, A., Birmingham.
HILLHOUSE, Prof. W., M.A., F.L.S.,
HINDS, J., Coventry. [Birmingham]
HOLLIDAY, JOHN, Watwick.
HOWES, H., Birmingham.
ILLIFFE, G., Nuneaton.
JONES, W., Birmingham.
JONES, H. W., F.C.S., Coventry.
KEARNES, R. H., Bilston.

LUCAS, JOSEPH, Birmingham.
MAGOR, MARTIN, Birmingham.
MORRIS, J. O., Walsall.
ORME, W., Atherstone.
PERRY, GEO. E., Birmingham.
PRATT, HENRY, Warwick.
PRICE, W., Birmingham.
PROSSER, F. H., Birmingham.
PULLIN, W. H., Leamington.
REEVE, T. L., Birmingham.
RICHARDSON, W. H., Dudley.
ROBINSON, A. E., F.C.S., Birmingham
SMITH, S. A., Leamington. [ham]
SOUTHALL, ALFRED, F.C.S., Birmingham
SPARSHOTT, H., Birmingham.
SPINSLURY, J., Leamington.
STANLEY, H., Leamington.
TAYLOR, SOL., Birmingham. [ham]
THOMPSON, CHAS., *Secretary*, Birmingham
THONGER, G., Harborne. [Birmingham]
TILDEN, PROF., D.Sc., F.R.S., Bir
VIRGO, C., Worcester.
WAKEFIELD, C. H., Malvern Wells.
WAKEFIELD, J., Birmingham.
WAKEFIELD, T., Birmingham.
WHITEHOUSE, JNO., Birmingham.
WILCOX, G., Birmingham.
WILKES, G. W., Birmingham.
WRIGHT, G., Burton.
WYLEY, W. F., F.C.S., Coventry

THE SITTINGS OF THE CONFERENCE WERE HELD IN THE
CHEMICAL LECTURE THEATRE, MASON SCIENCE COLLEGE, BIRMINGHAM,
ON TUESDAY & WEDNESDAY, AUGUST 31st, AND SEPTEMBER 1st, 1886,
Commencing at Ten a.m. each day.

TUESDAY, 31st AUGUST.

The EXECUTIVE COMMITTEE met, according to notices from the Honorary General Secretaries, at 9 a.m., in a class-room of the Mason Science College, Birmingham.

The CONFERENCE met at 10 o'clock a.m., adjourning at 1 p.m.; and at 2 o'clock, p.m., adjourning at 4 p.m.

Order of Business.

- Reception of Delegates.
- Report of Executive Committee.
- Financial Statement.
- Report of Treasurer of the "Bell and Hills Library Fund."
- President's Address.
- Reading of Papers, and Discussions thereon.

PAPERS.

1. *Crystallized Aconitine.* By J. WILLIAMS, F.I.C., F.C.S.
2. *Certain Derivatives of Hymenodictyonine.* By W. A. H. NAYLOR, F.C.S.
3. *The Assay of Elaterium.* By H. W. JONES, F.C.S., and FRANCIS RANSOM.
4. *A False Pareira Brava.* By W. KIRKBY, F.R.M.S.
5. *Ulexine, its Extraction, Characters, and Tests.* By A. W. GERRARD, F.C.S.
6. *A Chemical Examination of the Fruits of Daphnidium Cubea.* By J. O. BRAITHWAITE and E. H. FARR.
7. *Notes on Trade Samples of Citrate of Iron and Quinine.* By F. H. ALCOCK, F.C.S.

There was a mid-day adjournment between 1 and 2 p.m. for luncheon at the Grand Hotel.

At 4.30 p.m. members were conveyed in carriages to the Mint, and on their return were taken for a drive through Edgbaston to Cannon Hill Park, returning about 7 p.m.

WEDNESDAY, 1st SEPTEMBER.

The CONFERENCE met at 10 o'clock, a.m., adjourning from 1 p.m. till 2 p.m. The whole of the business of the Conference was completed this day by about 5 p.m.

Order of Business.

Reception of Delegates.

Reading of Papers, and Discussions thereon.

PAPERS.

8. *The Correlation of Studies in Botany and Materia Medica.* By Professor HILLHOUSE, M.A., F.L.S.
9. *Note on the Preparations of Nux Vomica in the British Pharmacopœia.* By N. H. MARTIN, F.L.S.
10. *The Preservation of Nitrite of Ethyl.* By J. WILLIAMS, F.I.C., F.C.S.
11. *The Belladonna Liniment of the British Pharmacopœia.* By FRANCIS RANSOM.
12. *Salol, a New Antiseptic.* By JOHN MOSS, F.I.C., F.C.S.
13. *Note on the "Pure Terebenes" of Commerce.* By W. LASCELLES-SCOTT.
14. *Note on the Impurity of "Pure" Terebenes of Commerce as shown by the Polarimeter.* By JOHN HODGKIN, F.I.C., F.C.S.
15. *Notes on the Estimation of Emetine.* By H. W. JONES, F.C.S.
16. *Vinum Ipecacuanhæ.* By J. C. SHENSTONE, F.R.M.S.
17. *American Musk.* By C. SYMES, Ph.D.
18. *Note on Iodoform.* By D. B. DOTT, F.R.S.E.
19. *Quinological Work in the Madras Cinchona Plantations.* By DAVID HOOPEE, F.C.S.
20. *Cinchona Cultivation in South America.* By DAVID HOWARD, F.I.C., F.C.S.
21. *Note on Compound Spirit of Ether.* By D. B. DOTT, F.R.S.E.

Place of Meeting for 1887.

Election of Officers for 1886-87.

There was a mid-day adjournment between 1 and 2 p.m. for luncheon at the Grand Hotel.

At the close of the Conference sittings, parties of members, under the guidance of gentlemen deputed by the Local Committee, visited Gillott's Steel Pen Works, and from thence drove to the Botanical Gardens.

THURSDAY, 2nd SEPTEMBER.

A large party of members and friends, accompanied by the Local Committee, proceeded by special train to Stratford-on-Avon, thence by rail to Leamington, where they were entertained to luncheon. From Leamington they were driven to Warwick Castle and Kenilworth, returning to Leamington *via* Stoneleigh Park. They were then conveyed by train back to Birmingham.

BRITISH PHARMACEUTICAL CONFERENCE.

MEETING AT BIRMINGHAM, 1886.

THE Twenty-third Annual Meeting of the British Pharmaceutical Conference commenced its sittings in the Chemical Lecture Theatre of the Mason Science College, Birmingham, on Tuesday, August 31st. Mr. T. Greenish, F.C.S., F.R.M.S., President, in the chair.

The following members and visitors were present during the meetings :—

- Aberdare*—Kay, J. P.; Thomas, W. I.
Aberdeen—Paterson, J.
Abergavenny—Shackleton, G. W.
Alnwick—Newbigin, J. L.
Auckland, N.Z.—Edson, J.
Ashton-under-Lyne—Bostock, W.
Balsall Heath—Barton, F.
Barnet—Young, R. F.
Barnsley—Lister, T.
Belfast—Goskar, J. J.; Payne, J. C. C.
Birmingham—Alcock, F. H.; Arblaster, C. J.; Asten, W.; Barclay, J.; Barclay, T.; Barrett, A. A.; Blackwell, J.; Chase, T.; Clayton, F. C.; Crooke, C. G.; Elliott, W. T.; Haydon, W. F.; Hillhouse, W.; Howes, H.; Hutton, H.; Perry, G. E.; Southall, A.; Southall, W. F.; Taylor, S.; Thompson, C.; Tilden, W. A.
Blandford—Groves, R. H.
Bolton—Forbes, J. W.; Gerrard, J.; Mason, W. B.
Bombay—Kemp, D. S.
Bournemouth—Spurway, F.; Worth, E.
Brighton—Leigh, M.; Savage, W. D. and Mrs.
Brighton (Calcutta)—Kernot, C. N.
Burton-on-Trent—Otley, T.

- Buxton*—Thresh, J. C.
Cardiff—Munday, J.
Ceylon—Trimen, H.
Cheltenham—Barron, W. ; Butcher, T.
Chester—Baxter, G.
Clifton—Berry, W. ; Schacht, G. F.
Colchester—Barrett, E. H. ; Shenstone, J. C.
Coventry—Axford, J. W. ; Axford, N. ; Fletcher, F. ; Jones, H. W. ;
 Wyley, W. F.
Dublin—Allen, N. W. ; Wells, W. F.
Dudley—Richardson, W. H.
Dundee—Laird, G. H.
Edinburgh—Mackenzie, J. ; Stephenson, J. B.
Glasgow—Kinninmont, A.
Gloucester—Meadows, H. ; Stafford, W. ; Ward, J.
Handsworth Wood—Brevitt, W. Y.
Hawick—Maben, T.
Hitchin—Ransom, F.
Hull—Bell, C. B.
Hurstpierpoint—Mitten, Miss Flora.
Hyle—Wild, J.
Ilkley—Worfolk, G. W.
Kenilworth—Barton, H. E.
Kingston—Bennett, H.
Leamington—Barrett, J. F. ; Davis, H. ; Pullin, W. H. ; Smith,
 S. A.
Leeds—Fairley, T. ; Reynolds, R. ; Ward, G.
Leicester—Burford, S. T. ; Clark, J. W.
Leighton Buzzard—Richmond, R.
Leith—McGregor, D. ; Coats, J. T.
Liverpool—Conroy, M. ; Maskery, S. ; Symes, C. ; Wellings, W.
London—Alden, J. ; Allen, C. B. ; Arkinstall, W. ; Armstrong,
 H. E. ; Baldock, J. H. ; Bindloss, G. F. ; Bourdas, J. ; Bowen, J.
 W. ; Brady, H. B. ; Bremridge, R. ; Clarke, F. ; Cocksedge, H. B. ;
 Crawshaw, E. ; Gerrard, A. W. ; Glazier, W. H. ; Greenish, T. ;
 Hampson, R. ; Holmes, E. M. ; Ince, J. ; Keene, J. and Mrs. ;
 Long, H. ; MacEwan, P. ; Madeley, S. E. ; Maitland, P. C. ; Mar-
 tindale, W. ; Millhouse, H. H. ; Minshull, Miss R. C. ; Moss, J. ;
 Naylor, W. A. H. ; Passmore, F. ; Plowman, S. ; Princep, P. ;
 Robinson, R. A. ; Sangster, A. ; Scott, W. L. ; Smith, F. J. ;
 Symons, W. H. ; Tidy, M. ; Tubman, R. ; Taylor, G. S. ; Um-
 ney, C. ; Warren, W. ; Watson, T. D. ; Williams, J. ; Williams,

T. H.; Willmott, W.; Winfrey, R.; Wootton, A. C.; Wright, T. R.

Manchester—Benger, F. B.; Elborne, W.; Gibbons, T. G.; Hart, J.; Huddleston, R. A.; Kemp, H.; Swain, C.; Wheeldon, J.; Woolley, G. S.

Market Drayton—King, W. G.

Melbourne—Bowen, W.; Roake, H.

Moseley—Brassington, W. R.; Featherstone, M.

Newcastle—Martin, N. H.

Nottingham—Patchett, E. C.

Oldbury—Homes, J. P.

Oxford—Druce, G. C.

Ramsey (I. M.)—Allen, T.

Redhill—Padwick, J.

Salisbury—Atkins, S. R.

Scarboro'—Whitfield, J.

Sheffield—Allen, A. H.; Kirkby, W.; Newsholme, G. T. W.; Ward, W.

Shrewsbury—Blunt, T. P.; Cross, W. G.

Smethwick—Gibbs, R. D.

St. Ives—Barton, H.

Stockport—Hart, T.

Stourbridge—Bland, T. F.

Stroud—Smith, D.

Sunderland—Harrison, J.

Swansea—Davies, J. T.; Grose, N. M.; Hughes, J.

Tarporley—Aston, W.

Walsall—Morris, J. O.

Wells—Mann, G. F.

Weymouth—Groves, T. B.

Wigan—Johnson, T.

York—Clark, J.

MEETING OF THE EXECUTIVE COMMITTEE.

A meeting of the Executive Committee was held in the Mason Science College, Birmingham, on Tuesday, August 31st, at 9.0 a.m.

Present:—Mr. T. Greenish, F.C.S., F.R.M.S. (President), in the chair; Messrs. Arblaster, Atkins, Barclay, Benger, Brady, Groves, Kay, Maben, Naylor, Perry, Reynolds, Schacht, Stephenson, Symons, Thompson, Umney, and Williams; and Mr. Plowman and Dr. Thresh (Hon. Gen. Secs.).

The minutes of the previous meeting were read and confirmed.

Letters regretting inability to attend were read from Professor Attfield, Messrs. Brunker, Carteighe, and Dott.

The order in which papers should be read at the General Meeting was discussed, and the programme arranged.

A draft Annual Report for presentation at the Birmingham meeting was submitted by Dr. Thresh, and after some slight alteration was approved by the Committee.

The Treasurer laid before the Committee the financial statement for the year 1885-6.

A list of proposed officers for 1886-7 was then adopted for recommendation to the General Meeting for election.

The place of meeting for 1887 was considered. Mr. Benger said that he was the bearer of an invitation from Manchester to the Conference to meet in that city next year. It was unanimously resolved that this invitation be recommended to the General Meeting for acceptance.

Mr. David Hooper, F.C.S. (Ootacamund) was appointed Secretary for Madras.

The following gentlemen were elected to membership:—

Adams, Mr. W., Worcester.	Cortfield, Mr. E., Birmingham.
Adeock, Mr. H. D., Worcester.	Crooke, Mr. C. G., Birmingham.
Allen, Mr. T., Ramsey, Isle of Man.	Davis, Mr. H., Leamington.
Arkinstall, Mr. W., London.	Druce, Mr. G. C., Oxford.
Barclay, Mr. J., Birmingham.	Elliot, Mr. W. T., Birmingham.
Barlow, Mr. F., Birmingham.	Ellis, Mr. C. G., Birmingham.
Blackwell, Mr. J., Birmingham.	Eynon, Mr. D. J., Leamington.
Bland, F. T., F.C.S., Stourbridge.	Featherstone, Mr. M., Moseley.
Blunt, T. P., M.A., Shrewsbury.	Forrest, Mr. J. K., Melbourne, Victoria.
Boully, Mr. J., Melbourne, Victoria.	Gerrard, Mr. J., Edge Fold.
Bowen, Mr. J. W., London.	Gibson, Mr. F., Birmingham.
Brevitt, Mr. W. I., Handsworth.	Harris, Mr. S., Droitwich.
Bullus, Mr. J., West Bromwich.	Haydon, W. F., F.C.S., Birmingham.
Butcher, Mr. T., Cheltenham.	Hillhouse, Prof., M.A., F.L.S., Birmingham.
Chapman, Mr. T. W., Birmingham.	Hodgkin, J., F.C.S., Stratford.
Coleman, Mr. E. F., Wolverhampton.	Hollick, Mr. R., Birmingham.
	Holliday, Mr. J., Warwick.
	Horton, Mr. G. D., Aston.

Howes, Mr. H., Birmingham.	Richardson, Mr. W. A., Dudley.
Humble, Mr. J. M., Birmingham.	Saunders, Mr. W. A., Liverpool.
Iliffe, Mr. G., Nuneaton.	Shackleton, Mr. G. W., Aberga-
Jones, Mr. W., Birmingham.	venny.
Kemp, Mr. H., Manchester.	Smith, Mr. H., Leamington.
Laing, Mr. A. S., Port of Spain,	Smith, Mr. R. J., London.
Trinidad.	Snape, Mr. G., Birmingham.
Lear, Mr. G. H., Birmingham.	Southall, Mr. Winifred, Edgbas-
Liverseege, Mr. J. F., Smethwick.	ton.
Lowther, Mr. T., Birmingham.	Stevenson, Mr. R. W., Derby.
Magor, Mr. M., Aston New Town.	Tame, Mr. T. W., Chepstow.
Marson, Mr. W., Stafford.	Taylor, Mr. F. W., Newport
Millhouse, Mr. H. H., London.	Pagnell.
Naish, Mr. C. E., Sparkbrook.	Tullett, Mr. T. W., Sparkbrook.
Norman, Mr. W. F., Leamington.	Wakefield, Mr. T., Birmingham.
Orme, Mr. W., Atherstone.	Wilkes, Mr. J. S., Birmingham.
Page, Mr. C., Birmingham.	

GENERAL MEETING.

Tuesday, August 31st.

Mr. T. BARCLAY, commenced the proceedings by welcoming, on behalf of the Local Committee, the Conference to Birmingham, and in doing so referred to the help which had been afforded by Professor Tilden, Professor Hillhouse, and others. Endeavours had been made by the Committee to make such arrangements as would insure the meeting being a very pleasant as well as a profitable one. They were fortunate in meeting at a time when an exhibition of the technical industries of Birmingham was being held at Bingley Hall, and the experiment which had been made on the previous evening of holding a conversazione had proved so successful that he had no doubt the same plan would be followed in the future. It was twenty-one years since the Conference had met in that town, under the presidency of Mr. Henry Deane, when the father of the late Mr. William Southall was Chairman of the Local Committee, and Mr. William Southall himself was Local Secretary. All these men had passed away, as well as Mr. Stoddart, of Bristol, Mr. Jones, of Leamington, and Mr. Dymond, each of whom took an active part in the proceedings; but their memory would long linger in the minds of those who knew them, and their

bright example would, he hoped, prove a most useful stimulus to the younger members of the profession, some of whom at any rate, would, he trusted, look back with a great deal of satisfaction to this meeting of the Conference in Birmingham.

Professor TILDEN also added a few words of welcome, and expressed the great pleasure it afforded him to meet so many old friends, many of whom he had known since his student days at Bloomsbury Square.

The PRESIDENT briefly acknowledged the words of welcome which had been uttered.

Reception of Delegates.

Mr. PLOWMAN, F.R.C.S., Senior Honorary General Secretary, then read the following list of delegates to the Conference :

Pharmaceutical Society of Great Britain.—The President, Vice-President, and Messrs. S. R. Atkins, Cross, R. Hampson, W. D. Savage, G. F. Schacht, C. Symes, and J. Williams.

Pharmaceutical Society of Great Britain (North British Branch).—Messrs. J. Borland, D. B. Dott, A. Kinninmont, J. Mackenzie, J. B. Stephenson, and R. Storie.

Pharmaceutical Society of Ireland.—Mr. J. E. Brunner, M.A. (President), Messrs. W. N. Allen, J. C. C. Payne, and W. F. Wells, jun.

Aberdeen and North of Scotland Society of Chemists and Druggists.—Messrs. J. P. Kay, J. Paterson and J. Sim.

Brighton Association of Pharmacy.—Messrs. Marshall Leigh and W. D. Savage.

Bristol Pharmaceutical Association.—Mr. G. F. Schacht.

Hawick Pharmaceutical Association.—Mr. T. Maben.

Hull Chemists' Association.—Mr. C. B. Bell.

Leeds Chemists' Association.—Messrs. G. Ward and R. Reynolds.

Leicester and Leicestershire Chemists' Association.—Messrs. S. F. Burford, J. W. Clark, and W. Thirlby.

Liverpool Chemists' Association.—Messrs. A. C. Abraham, M. Conroy, A. H. Samuel, and W. Wellings.

London Chemists' Assistants' Association.—Messrs. A. A. Deck, E. H. Farr, and H. H. Millhouse.

Manchester Pharmaceutical Association.—Messrs. F. B. Benger, G. S. Woolley, and W. Elborne.

Sheffield Pharmaceutical and Chemical Society.—Messrs. News-holme, Ward, and Kirkby.

Mr. PLOWMAN said they had there some gentlemen who were in no way delegates, but who had come in acceptance of an invitation given to them by the Executive Committee, and who were distinguished Colonial and Indian gentlemen. He thought it right to announce at the time the names of the gentlemen: Mr. Bowen, the President of the Pharmaceutical Society of Australasia; Mr. D. S. Kemp, of Bombay, who until he left India did good service to the Conference as Indian Secretary for Bombay; Dr. Kernot, who had done the same service for the Conference in Bengal; Dr. Trimen, of Ceylon; and Mr. Herbert Rocke, of Melbourne, who had done good service in forwarding parcels to Australia. Mr. Bosisto had sent them a message that he could not come, as he was now at work inspecting the wine-growing districts of Europe.

The PRESIDENT said he could not allow the list of delegates to be read without saying that they welcomed them all, but especially those who came from the Colonies and India.

Mr. D. S. KEMP (Bombay) thanked the Conference, on behalf of the Colonial and Indian visitors, for the welcome they had received. The services which he had rendered to the Conference had been very small compared with the great benefit which the Pharmaceutical Society had conveyed to chemists abroad. The publications on pharmaceutical subjects which reached them constantly were of very great benefit to chemists abroad, and it would be saying very little for them if they did not, when it lay in their power, make a return to the Society for the services they received. He assured them that it afforded them very great pleasure to be present at this Conference.

Mr. PLOWMAN stated that letters of apology for non-attendance had been received from Professor Attfield (London); H. B. Baidon (Edinburgh); J. E. Brunner (Dublin); M. Carteighe (London); Dr. J. Clark (Edinburgh); R. H. Davies (London); M. Dechan (Hawick); D. B. Dott (Edinburgh); A. Gibson (Fife); T. P. Gostling (Diss); W. Hills (London); J. Nesbit (Portobello); B. S. Proctor (Newcastle); Dr. Quinlan (Dublin); D. Ritchie (Aberdeen); L. Siebold (Bury); J. Sim (Aberdeen); C. E. Stuart (Newcastle); A. E. Tanner (London); Dr. Tichborne (Dublin); T. Tyrer (London). It was then announced that a cablegram had just been received from Mr. A. H. Mason (Montreal), wishing the Conference a pleasant meeting.

Dr. THRESH, F.C.S. (Hon. Gen. Sec.), then read the report of the Executive Committee, as follows:—

REPORT OF THE EXECUTIVE COMMITTEE.

During the past year the attention of your Committee has been chiefly engaged at its several meetings upon the routine business of the Conference. One special and important matter has, however, required its attention. In the report presented last year to the Aberdeen meeting, it was stated that your Committee had resolved to publish a General Index to the *Year-Book of Pharmacy*, and that a Sub-Committee had been appointed to arrange the necessary details. This Sub-Committee has met on several occasions, and the result of its labours has been such, that at a meeting of the Executive Committee, held on June 10, 1886, Mr. Plowman, the Secretary to the Index Committee, was enabled to present a report stating that a few bound copies of the Index had then been completed, and that the printers could commence delivery to members at once. Twelve hundred and fifty copies have been prepared, and a considerable portion of this number has been distributed to members.

The General Index consists of 246 pages, and contains complete references to the Proceedings of the Conference since the inaugural meeting, and of the subject matter of the whole series of Year-Books, including the 1885 volume. It has been issued at the nominal subscription of 2s. 6d., and on this account has caused a considerable financial loss to the Conference. Your Committee nevertheless feels that this expenditure, approved of by the Aberdeen meeting, is fully justified, since it is difficult to over-estimate the enhancement in value of the many volumes of the Year-Book as works of reference caused by the publication of a General Index up to date. A limited number of copies of the Index is still for disposal, and can be supplied to members, postage free, at the rate of 2s. 6d. per copy, on application to the Secretaries.

It is peculiarly appropriate to refer to the Colonial and Indian business of the Conference at a time when a Colonial and Indian Exhibition is being held at South Kensington. Your Committee has much pleasure in being able to report that the affairs of the Conference in the Colonies and India continue to be in a most satisfactory condition. The large increase in the number of members residing abroad consequent upon the appointment of Colonial and Indian Secretaries has been fully maintained. These gentlemen have not relaxed in their efforts on behalf of the Conference in

their respective districts, and by their loyal action and personal influence have been largely instrumental in securing the friendly co-operation of our Colonial and Indian *confrères*. Mr. David Hooper, F.C.S., Government Quinologist in Madras, and the newly appointed Secretary for that Presidency, sends a paper to be read at this meeting, entitled, "Quinological Work in the Madras Cinchona Plantations."

It is with very great regret that your Committee has to announce officially the deaths during their tenure of office of Mr. Henry Sugden Evans, Secretary for Canada, and of Mr. L. B. Bush, Secretary for New South Wales. Both did good service to the Conference, and freely and ungrudgingly devoted a large amount of time in promoting the truest and best interests of the Conference in Canada and New South Wales. Mr. D. S. Kemp has resigned the Secretaryship for Bombay, owing to his leaving India. The following Colonial and Indian Secretaries have been appointed since the last general meeting of the Conference: Bombay, Erasmus Beynon; Canada, A. H. Mason, F.C.S.; Madras, David Hooper, F.C.S.; New South Wales, Ryder Horton.

It is a subject for congratulation that no other gathering in which pharmacists are interested takes place this year, so as in any way to clash with the Conference meeting. In 1884 the meeting of the British Association at Montreal, and in 1885 the International Pharmaceutical Congress at Brussels, prevented some of the members from attending the Conference gatherings during those years. There are several new features in the present meeting. Last evening members met the President and officers of the Conference at a *conversazione* at the Grand Hotel. Your Committee feels that members have not in former years had sufficient opportunity of becoming known to each other. The means afforded by the excursion have not in the opinion of your Committee been quite adequate for this purpose in the past. It must be admitted that last night's experiment was highly successful, and calculated to promote one great object of the Conference, viz., friendly intercourse and common goodwill among pharmacists. This object will be further advanced by a concert and social evening on the night of Wednesday, September 1. Some alterations in the hours of the business sittings of the Conference have been made. The object of these alterations is to allow the business of the Conference to be concluded in such time as to afford members an opportunity of visiting works and places of interest in the neighbourhood. On some former occasions these

visits have been paid during the luncheon interval, and there has been great difficulty in getting members together again in proper time for the afternoon sitting.

During the past year no grant in aid of research has been applied for, and no report of any research for which money has been granted will be presented this year; but twenty papers will be read at the present meeting. One paper was considered not quite suitable for the Conference, and the author was requested to withdraw it.

Mr. Siebold was last December re-appointed Editor of the "Year-Book" for 1886. The manuscript of Parts I., II., and III., is now on the table, and includes all the abstracted matter in the forthcoming volume.

Since the last General Meeting ninety-two gentlemen have been elected to membership.

It is the painful duty of your Committee to report the death during the past year of Mr. William Southall. Mr. Southall was President of the Conference during 1880, and performed the duties of the office with marked tact and ability. Although for many years before his death he frequently suffered from ill-health, he always retained his kindly geniality, and never relaxed in his desire to further the best interests of the Conference. Many members will miss his personal friendship and will mourn his loss.

Your Committee regrets to have to announce that the Senior Honorary General Secretary, Mr. Plowman, has, in accordance with a desire he expressed last year, tendered his resignation; and as his decision is final, his duties will terminate after the present meeting.

Mr. Plowman has served the Conference in the capacity of Hon. Gen. Sec. for five years, and his exertions on its behalf have been so indefatigable that the Committee feels it its duty to record its sincere appreciation of his services, and to acknowledge that much of the success of the meetings which have been held during his tenure of office has been due to his exertions.

Mr. Umney (Treasurer) submitted the following financial statement :—

FINANCIAL STATEMENT FOR THE YEAR ENDING JUNE 30TH, 1886.

The Hon. Treasurer in Account with the British Pharmaceutical Conference.

1885.	Dr.	£ s. d.	£ s. d.
July 1.	To Assets forward from last year—		
	„ Balance in hand at Bank	220 16 7	
	„ Cash in Secretary's hands	0 3 6	
	„ Messrs. J. and A. Churchill's Account	118 6 8	
1886.			339 6 9
June 30.	„ Sale of Year-Book by Publishers	19 6 8	
	„ Sale of Year-Book by Secretary	10 10 0	
			29 16 8
	„ Advertisements, 1885 vol.	115 13 0	
	„ „ 1884 vol.	15 11 6	
			131 4 6
	„ Subscriptions from Members		651 17 2
	„ Index Book, sale of, per Secretary		0 15 0
	„ Outstanding Liabilities, viz., Messrs. Butler & Tanner's Account unpaid		137 2 0
	„ Difference to balance		0 0 4
			<u>£1290 2 5</u>

1886.	Cr.	£ s. d.	£ s. d.
June 30.	By Expenses connected with Year-Book :—		
	Printing, Binding, Publishing	376 16 5	
	Postages and Distributing	51 17 6	
	Advertising and Publishers' charges	36 0 8	
	Editor's Salary	150 0 0	
	Foreign Journals	5 2 6	
			619 17 1
	„ Expenses connected with Index to Year-Book :—		
	Printing, Binding, Publishing	126 2 0	
	Postages and Distributing	6 0 0	
			132 2 0
	„ Secretary's Salary (Mr. Princep)	100 0 0	
	„ Blue Lists	9 6 4	
	„ Printing and Stationery	35 1 1	
	„ Postages	31 10 0	
			175 17 5
	„ Expenses of Aberdeen Meeting (Rent of Hall)	5 5 0	
	„ Mr. Princep (Secretary)	9 0 0	
			14 5 0
	„ Petty Cash		6 13 8

1886.

June 30.	By Expenses per Colonial Secretaries, Addressing Circulars and Distributing Bills, etc. :—	£	s.	d.
	New Zealand Secretary	0	18	10
	Victoria Secretary	1	1	0
		<hr/>		
			1	19 10
	„ Assistant for Mr. Princep while ill		1	10 0
	„ Expenses for Bank Charges, Collections, etc.	0	1	9
	„ Cheque Book	0	8	4
		<hr/>		
			0	10 1
	„ Outstanding Assets :—			
	Messrs. J. and A. Churchill's Account.	114	10	6
	„ Balance at Bank	219	7	0
	„ Cash in Secretary's hands	3	9	10
		<hr/>		
			£1290	2 5
		<hr/>		

1886, July 1, Assets	{ Cash	£222	16	10
	{ Churchill's Account (since paid)	114	10	6

The Bell and Hills Fund.

1885.	Dr.	£	s.	d.
July 1.	To Balance in hand	22	18	2
„ 7.	To Dividend on Consols, £350	5	1	6
1886.				
Jan. 7.	To Dividend on Consols, £350	5	1	6
		<hr/>		
			£33	1 2
		<hr/>		

1885-6.	Cr.	£	s.	d.	£	s.	d.
By Purchase of Books for Aberdeen, per Hy. Kimpton		10	16	9			
„ Balance		22	4	5			
		<hr/>				£33	1 2
		<hr/>					
By Cash in Bank		12	1	5			
And Dividends accrued on Consols, but not received prior to the closing of the Accounts		10	3	0			
		<hr/>				£22	4 5
		<hr/>					

1886, July 1, Assets	{ Cash	£22	4	5
	{ *Consols	350	0	0

Audited and found correct, JAMES PATERSON, Aberdeen.
 August 23rd, 1886. CHARLES J. ARBLASTER, Birmingham.

* Securities viewed.

Mr. PATERSON, one of the Auditors, recommended that the accounts of the Conference should in future be kept in a more systematic and business-like manner,—

The PRESIDENT moved the adoption of the Report and Financial Statement.

Mr. W. D. SAVAGE (Brighton) seconded the motion, which was carried unanimously.

The PRESIDENT then delivered the following address :—

THE PRESIDENT'S ADDRESS.

To be chosen to fill the presidential chair on the occasion of the meeting of the British Pharmaceutical Conference in Birmingham I feel to be a great honour ; but it involves an amount of responsibility from which a timid nature would incline me to shrink, and the responsibility assumes larger proportions now that the vigorous efforts made to extend the membership to India and the Colonies have been attended with such marked success.

My first duty is to offer a cordial welcome to you all ; it is an agreeable one, and I do it most heartily.

It may be that you will expect from me an encouraging review of a year of work done in the direction of the advancement of pharmacy, together with the well-being of the pharmacist. I do not propose, however, to devote much of my address to a review of the past ; I prefer to utilize its lessons in an attempt to grapple with the problems of the future. In the past, and, indeed, in the present, I see so little that is cheering, and so much that is discouraging, that I must ask you beforehand to forgive me if in speaking of them my remarks are somewhat decisive, my disapproval or condemnation freely outspoken.

When the Conference met last year in Aberdeen, the new edition of the national Pharmacopœia was just being issued. Since then that work has been the subject of much discussion and criticism among pharmacists, and one result has been the publication of numerous and important errata, so that allusion to that work on the present occasion can scarcely be avoided. Without going into details, the question may now be asked, Does the British Pharmacopœia of 1885 represent the advance which has taken place in pharmacy in the interval between that and the preceding issue ? It is my own opinion—and I think it more than probable that there is a general consensus of opinion—that it does not ; but that this last edition represents the diligent gathering of fragmentary

papers with an absence of the applied practical knowledge necessary for the proper elaboration of such a work.

The production of a Pharmacopœia that shall be fully equal to our ideal of such a book must always be difficult, perhaps impossible; but a strenuous effort should be made to place it on a level with progress in the science and in the art of pharmacy. A British pharmacist taking part with pharmacists of other and more favoured nations in the deliberations on the formation of an international Pharmacopœia, cannot but feel humiliation at the position occupied by the pharmacists of Great Britain in respect to the compilation of their national text-book. The validity of their claim to a more practical recognition is not a new idea, but one largely entertained and assented to by the medical profession. Pharmacists will, therefore, do wisely to press their reasonable and just demand for a more direct voice in the preparation of the formulæ of successive editions of the British Pharmacopœia, for it is impossible for any man or body of men to resist indefinitely the pressure of surrounding opinions. Meanwhile, I cannot leave the subject without expressing the regret I feel, in common with all pharmacists, that our efforts for the advancement of pharmacy are not yet legally recognised as a sufficient basis for a claim to representation in the Pharmacopœia Committee of the Medical Council.

But are we, as pharmacists, free from some share of blame in this matter? Have we, as a body, taken any concerted action with the view of improving the processes for those preparations already in the Pharmacopœia, or have we taken any steps to examine new and hitherto little known drugs, and to supply the most suitable formulæ for the preparations of the same before they get into the hands of the "mystery-mongers," by whom they are brought to the notice of the medical profession? If the answers to these questions involve us in some reproach, I rejoice to know there is a prospect of this soon being taken away. In the research laboratory which it is proposed to establish and supply with modern conveniences for conducting original work, advanced students, already trained and disciplined in scientific method, will meet with encouragement and assistance to do thoroughly that which time and opportunity did not previously admit of.

I cannot refrain from expressing an individual hope, but one which I have no doubt will be shared by you all, that when the claims of original research are satisfied, there may be found some quiet spot where vegetable histology in its application to *materia medica* may be systematically pursued by students in pharmacy,

where the value of the microscope as a means of identifying drugs, and recognising adulterations and substitutions, will be fully appreciated.

The meeting of the International Congress in Brussels cannot be lightly passed over. The issue of an approved International Pharmacopœia, essential as a companion to, but not to supersede any national Pharmacopœia, which shall contain only active drugs and their medicinal preparations, may be an event in the future; but whether in the near future or not, it is impossible that pharmacists practising pharmacy under different conditions, and subject to different pharmacy laws, can meet together in Congress without mutual advantage. Probably when the time arrives that an International Pharmacopœia may reasonably be expected, it will be found that many of the advantages sought for in the compilation of such a work, have been gradually and almost imperceptibly attained by more frequent intercourse and familiar conversation. These international courtesies, whilst being very agreeable, are also very valuable; and if the issue of an International Pharmacopœia were to be considered as their sole and ultimate aim—in fact, their “finality”—I could wish, for the sake of pharmacy generally, that the result should be postponed for at least another generation.

So much for the past, and now for the present and future.

An address may consist mainly of platitudes, or of statements of fact or of opinion, with which those present would be quite agreed; but I hold it as quite within the lines of a presidential address to start fresh topics, and give food for *active* thought. This is done in the United States, where the presidential address is frequently referred to a Committee, to bring up subsequently a report upon suggestions contained in it, and, if desirable, to frame a resolution for adoption.

In considering the subject of an address for the present occasion, I have thought it might be of advantage to refer to the official definition of the Conference and its objects: “An organisation established for the encouragement of pharmaceutical research, and the promotion of friendly intercourse and union among pharmacists.” Whilst, perhaps, it may be admitted that the first of these has been fairly well attained, I fancy I see year by year a growing tendency to a diminution of that friendly intercourse which characterised our early gatherings. Recent meetings have shown signs that the Conference is getting into a sort of “rut”; there have been of late but few fresh faces, excepting those belonging to the places visited, whilst there has been an increasing number of

papers summarised or read in the absence of the authors, and then, as a consequence, rarely followed by discussion or interchange of opinion. It may be that this has been due to the comparative absence of non-technical topics from our discussions, and that, in our desire to avoid certain phases of pharmaceutical politics, we have ignored subjects that are of the utmost importance alike to ourselves and the public.

The question I would raise is, Shall the Conference be considered a "mutual tickling and admiration society," or can it employ itself in certain *active* duties for the benefit of its members and all those who practise the art of pharmacy?

I am very reluctant to throw a stone into so placid a pool of self-esteem, but I must confess to a feeling that the British Pharmaceutical Conference is an association which, if it continues to exist for any practical benefit, must assume more *active* duties than it has hitherto done, or the *raison d'être* of its existence will certainly be called in question.

We cannot but feel some sympathy with that cry of distress which reaches us from pharmacists in the near and remote districts of Great Britain, with regard to the present condition of our art. Excepting in some of the centres and the more important provincial towns, pharmacy has no existence for pharmacists; the pharmacy of the country is absorbed by medical men, and the very soul of pharmacy is taken out of those who are ostensibly engaged in its practice, and whose legitimate calling it undoubtedly is. With a given number of inhabitants, there is an average amount of sickness; but the pharmacist, especially in country districts, literally sees nothing of it, and he is obliged to turn his attention in other directions to satisfy the claims of his family, and to relieve the burdens imposed on him by society and the State. When a prescription makes its appearance, once a fortnight or thereabouts, all hands, apprentices included, are called forward to see this curious interruption to their ordinary duties. It is in these "happy hunting grounds" that our apprentices conceive their first ideas of pharmacy; and is it to be wondered at that when they enter the examination room a prescription should prove as great a curiosity as it did before?

If pharmacy in a large proportion of the places where it is supposed to be practised were only a little lower, it would cease to exist; in fact, I am not sure that we are not gradually but surely drifting into that condition when there will be a line of separation, not faint and obscure, but marked and determined,

between the pharmacist proper and the retailer of drugs or the drysalter.

The remedy is not so obvious. The entire separation of the practice of medicine from that of pharmacy, such as obtains in continental countries, suggests itself; but is this great change practicable within a limited period of time? Legislation on the subject must not be anticipated. Perhaps the pharmacist, showing greater scientific and practical skill in the conduct of his art than can be expected in a surgery, will acquire the greater confidence of the public, and I think it may be assumed that the higher and continually improving character of the education of the medical profession, will insensibly tend to dissociate the practice of medicine from that of pharmacy.

But there is an evil growing up in the very midst of us, and assuming large proportions, which should be grappled with, I think, by this Association. I will call it "wholesale prescribing for the medical profession," absolutely dictating to that body in what relative proportions a combination of well-known drugs should be prescribed. These proprietary preparations, for the most part "factory made," thrust upon the medical profession and unblushingly advertised, are sapping the foundations of true pharmacy, and at the same time depriving the pharmacist of the legitimate practice of his calling.

There can be no desire on the part of the pharmacist to limit the members of the medical profession in their choice of remedial agents for the treatment of disease; but that question is not involved in the consideration of this practice. A pharmacist with any dispensing business finds it necessary to keep an extra "light porter," technically termed a "runner," to find out which of his neighbours has been the unfortunate purchaser of a 4s. 6d. bottle of some nostrum required to enable him to complete a 1s. 6d. mixture. *Mist. Magnesiae et Bismuthi Comp.*, and (Jones) within brackets, is typical of a large number of them. Magnesia is well known; of bismuth the profession cannot be ignorant; but the charm lies in the "Comp.," which conceals the colouring and flavouring agents necessary for effect. In fact, these secret proportional combinations of ordinary drugs are accepted as if they were more effective than the same drugs combined in a prescription adapted to the requirements of careful diagnosis.

Pharmacists are harassed by the demand for these proprietary prescriptions, which prescribers take up without thought, and without a second thought thrust aside, their unofficial pharma-

copœia being mainly the advertisement pages of the medical journals.

It is not the province of the pharmacist to call in question the therapeutic value of any medicine, but it does seem to him curious that a spirit said to be distilled from a non-volatile drug should possess any more medicinal value than ordinary spirit in a state of more or less dilution. What advantage can it be to therapeutic science to know that a certain compound has been found useful in a certain class of diseases, if the composition of the medicine be a trade secret?

The members of the medical profession are largely responsible for the growth of this evil. Whilst in their collective capacity they strongly condemn "nostrums," yet individually many daily prescribe them. It is a practice perplexing to every pharmacist and derogatory to the medical profession, which justifies the apprehension expressed by Dr. Quain in his Harveian oration, that "the art of writing a rational prescription is in danger of becoming lost, and may indeed have a still more prejudicial influence now that the furnishing of gratuitous medical advice is being made the means of pushing the sale of proprietary nostrums."

This phase of pharmaceutical business assumes many different forms, and I ask you now to determine for your own protection to grapple with this hydra-headed monster before the knell of true pharmacy is sounding in your ears. It is by no means too early to make the effort, and it may not yet be too late; by-and-by you may cry like women for the loss of those privileges you have failed to defend like men. One way of doing this will be for us to see that we ourselves meet as far as possible the wants of the medical profession. If unofficial preparations of a certain type attain favour with the profession, why should we not as soon as possible place ourselves in a position to supply them? If after careful examination of such compounds, *quasi* authoritative formulæ for their preparation were published, that portion of the medical profession which had seen such happy results from the use of the "nostrums" would, it might be hoped, if the formulæ were issued by the British Pharmaceutical Conference, be only too glad to prescribe them as *Mist. Magnesiae et Bismuthi Comp. B.P.C.*, etc., and every intelligent pharmacist could prepare them in his own pharmacy. This would apply to a long list of preparations of which *mist. magnesiae* is typical.

Would not the Conference be a very proper body, and the very proper body, to take up this subject, to investigate these much

lauded new preparations that make their appearance with the usual advertising *éclat*, and to give definite formulæ for the same; so that medical practitioners might be able for themselves to determine in what cases to employ the remedies persistently thrust under their notice with successful cases manufactured ready to hand? Medical science might thus be materially assisted and pharmacy elevated at the same time.

Any formulæ published under the auspices of the British Pharmaceutical Conference would be issued with its transactions. They might also be published separately as the "Unofficial Formulary of the British Pharmaceutical Conference," and thus be brought under the notice of prescribers with a suggestion that instead of ordering a preparation with one particular maker's name, as for instance "Jones," the formulæ sanctioned by the Conference should be indicated by the letters B.P.C. Surely a large portion of the medical profession would consider this a boon, and gladly avail themselves of it. I now leave this subject to be dealt with as the Conference may see fit.

Another subject that demands immediate attention in the interests of the future of pharmacy, is the still unsatisfactory and inadequate provision for pharmaceutical education in the provinces. It would be impossible to overestimate the service rendered by the Conference in affording an opportunity for pharmacists being brought into contact with each other; this alone is a matter of the first importance. The Conference has also been mainly instrumental in bringing to the front many young but able men, who may be looked upon to fill our vacant places with advantage to the body and credit to themselves. Wherever, too, the Conference meets, there results from its presence something like a step—and perhaps the first step—towards organization for the general good of the young men in that locality who are engaged in pharmacy. But notwithstanding all that has been done by this Conference, by the Pharmaceutical Society, and by other associations that may also exist, the trade in its broadest sense is still only very partially organized to work for the common good. Especially is this the case with regard to organization for providing anything worthy of the name of pharmaceutical education.

The subject of Pharmaceutical Education is every year claiming a greater share of attention. One great difficulty that lies before us arises from the very loose manner of receiving and employing apprentices. It cannot be reiterated too often that a youth destined for pharmacy should before leaving school have been taught at

least the elementary branches of a good English education, or he cannot be expected to master the principles of those sciences which directly or indirectly govern the practice of pharmacy. Another equally great difficulty is that, in a large majority of cases, the young man has no satisfactory opportunity for acquiring a knowledge of these elements of science during the period of his pupilage. The question which now awaits solution is how to provide an adequate remedy for a condition of things which has become chronic, and which has paralysed every isolated effort made throughout the country. Schools have sprung into existence, but in a very short time they have dwindled into obscurity. Not long since it was suggested by a member of the Pharmaceutical Society that prizes should be offered for competition in provincial schools. The project was entertained by the Council, but when the provincial schools were sought for, they had all with one or two exceptions ceased to exist, by a slow but gradual process of decay.

To my mind this is not due so much to absence of demand for such teaching, as to the need of organizing—in fact, for focussing as it were—the demand in quantities that will command a supply. I know and feel that I am treading on debateable ground, but I will place my views before you for your earnest consideration.

I would suggest that for the organization of the demand and supply of pharmaceutical education, as well as for other purposes which I will allude to presently, Great Britain might be mapped out into districts, say about fifteen, twelve in England and Wales, and three in Scotland. Each district might be under the special supervision of a representative local committee, whose business it should be to establish one or more educational centres for its respective district, *utilizing as far as possible existing university or college teaching*, or when this is not practicable, negotiating for the establishment of suitable courses of lectures. Many of the divisions that I would suggest contain within their limits, and in more or less central positions, important educational institutions, which, if they do not already include within their curriculums exactly the teaching required, would no doubt be ready to do so were there evidence of any adequate demand for it.

Upwards of eight hundred candidates come up for the Minor yearly, and nearly four hundred pass; this number should furnish fair-sized classes at so limited a number of centres. But even if the classes were sometimes not large enough to be self-supporting, the committees would then be in a position to call upon the Council

of the Pharmaceutical Society for the aid which it has over and over again, under successive Presidents, expressed its willingness to give wherever there is proper organization.

The question then arises as to how these Committees of organization should be constituted. The most promising materials that I can see are the local secretaries of the Pharmaceutical Society resident in the districts, or at least a certain portion of them, and, in addition, any member of Council might be an *ex officio* member of a Committee. The manner of election of these local secretaries gives them essentially a locally representative character, and as I contemplate the possibility of the Pharmaceutical Society being called upon to contribute liberally from its surplus income, it seems only reasonable that those entrusted with this work should have some official connection with that Society. It will be remembered that the local secretaries are appointed by the Council on the nomination of the members and associates of the Society resident in the respective districts. Every town in Great Britain (except London and Edinburgh) that returns a member to Parliament, and any other town in which there are resident not less than three members or associates in business, is entitled to nominate a local secretary, the number of them at present being over three hundred. These Committees could furnish annual or half-yearly reports to the Council, and formulate recommendations. The incidental expenses of such Committees might be agreed upon and paid, up to a certain amount, by the Pharmaceutical Society, and these several organizations would become, as it were, provincial branches.

Without trenching on the province of any other provincial association, such Committees would keep the Council in touch with the entire country, and they could be made available for much useful work in connection with other business required by the Pharmaceutical Society. If I read the signs of the times aright, our next political struggle will be for the very existence of our present rights rather than the extension of our present privileges. We shall then require union and strength, both of which would be promoted by these organizations.

I need only remind you of the Poison Bill introduced by Lord Carlingford, in which it was suggested that the initiation of articles into the Poison Schedule should be taken from the Council of the Pharmaceutical Society, and that it should rest entirely with the Privy Council. Were that privilege allowed to pass from your control, the position of the proverbial "toad under a

harrow" would be preferable to that of the chemist and druggist subjected to the vagaries of a department practically ignorant of the exigencies of the medical profession and the requirements of the various industrial occupations. But on the other hand, in considering grave public questions, such as the sale of poisons, we must take care that the cry, "Our craft is in danger," be not the main consideration, and stand in the path of legitimate progress.

British pharmacists cannot, however, be further organized for educational or any other purposes by simply reiterating abstract statements as to the desirability of such organization and the benefits that would possibly accrue from it. In this respect the subject has already lost all charm of novelty; therefore, as I have made myself responsible for once more bringing it forward, I feel bound at least to offer a contribution towards the building up of the edifice. Even if my contribution be condemned as wood, hay, and stubble, fit only to be burned, it may yet serve a good purpose, since the evoking of the active thought necessary to put it out of the way may also result in substituting for it at least a "button" of the precious metals. I will therefore venture to place before you in some detail, but still very briefly, my ideas as to the formation of the suggested districts, and then add a few words as to the probable expense.

District No. 1.—Commencing with the North of England, the first district might be defined by one line following the boundary of the two kingdoms, and another line running straight from the mouth of the Tees on the east to Morecambe Bay at Morecambe on the west. The district would include Northumberland, Durham, Cumberland, Westmoreland, and a part of Yorkshire. A Committee consisting of twenty-one members could be formed from the Local Secretaries of the Pharmaceutical Society, and they might perhaps find in the University of Durham, or the recently established School of Pharmacy at Newcastle-on-Tyne, materials for the voluntary organization of the education required.

District No. 2.—Following the southern limit of the preceding division from Middlesborough, at the mouth of the Tees, westward to a spot about Kirkby Lonsdale, a line drawn from thence south-east to a point a little south-west of Sheffield, and then striking north-east to the mouth of the Humber, would include a purely Yorkshire district, represented by twenty-eight Local Secretaries, and having Leeds, with its Yorkshire College of Science, and York, in fairly central positions, besides Sheffield, with Firth College, on its borders.

District No. 3.—Proceeding further westward from Kirkby Lonsdale along the southern limit of District No. 1 to Morecambe, a line passing south-east to Stoke, and then north-east to the south-west corner of district No. 2, and following that boundary line north westwards again to Kirkby Lonsdale, would include a district smaller in area than most of the other districts, but having a dense population. It would take in many important manufacturing towns in Lancashire, including Manchester, with Owens College, and portions of Yorkshire, Cheshire, Staffordshire, and Derbyshire. It is represented by twenty-nine Local Secretaries.

District No. 4.—This district might be defined by the western boundary of No. 3 and a line drawn almost due west from Stoke to Port Madoc. It would include the remainder of Lancashire and Cheshire, as well as Denbigh and Carnarvon. Liverpool, with its new School of Chemistry, would be available as an educational centre, and the district would furnish a Committee of eighteen members.

District No. 5.—Returning to the east coast, another district might be defined by passing from the mouth of the Humber along the southern boundaries of Districts 2 and 3 to Stoke; drawing from thence a line south-east to Northampton, and then north-east to Boston Deep. The district would include Lincolnshire, Nottinghamshire, Rutlandshire, and parts of Derbyshire, Leicestershire, and Northamptonshire. There is a College of Science at Nottingham, and in the district there are about twenty-seven Local Secretaries.

District No. 6.—Proceeding further westward from Stoke, the limits of this district might follow the southern boundary of No. 4 to Llangollen; from thence pass due south to a point a little westward of Abergavenny; then due east to Buckingham, northwards to Northampton, and return north-westwards to Stoke. This would enclose Shropshire, Worcestershire, Warwickshire, and parts of Northamptonshire, Herefordshire, Radnorshire, and Montgomeryshire. Our present place of meeting, Birmingham, would present in its Mason's College at least one possible educational centre, and the district would contribute about thirty-three Local Secretaries to form a Committee.

District No. 7.—A line passing from Llangollen due south along the western boundary of No. 6, and prolonged to Newport, would divide off a purely Welsh district; consisting principally of the counties of Carmarthen, Pembroke, Cardigan, and Glamorgan.



MAP OF ENGLAND.

This district, although a fairly large one, is not at present so fully represented in the Pharmaceutical Society as most others; but nevertheless its ten Local Secretaries might form a good working Committee.

District No. 8.—Returning once more to the east coast and starting from Boston, a line passing along the southern boundary of No. 5 to Northampton; thence southward along the eastern boundary of No. 6 to Buckingham, and then returning eastward to the German Ocean about the mouth of the Blackwater river, would enclose a very important area. It would include Norfolk, Suffolk, Huntingdonshire, Cambridgeshire, Bedfordshire, and the northern portions of Hertfordshire and Essex. As, however, London would be quite easy of access from some parts of this district, it seems probable that its demand for provincial education would be somewhat diminished. The district has thirty-two Local Secretaries. I am not aware that there is any available educational institution in this district, although it boasts an ancient university. But probably it will be some time before Cambridge or Oxford will follow the example of continental universities, and include a pharmaceutical curriculum within their calendars.

District No. 9.—Another important district, but similarly affected in respect to access to the metropolis, would be divided off by a boundary line passing from Gravesend and the mouth of the Thames to Portsmouth, including the counties of Kent and Sussex and a portion of Surrey. It would be represented by about twenty-five Local Secretaries.

District No. 10.—Another district might be marked out by a line starting at Portsmouth and passing a little way north-east along the boundary line of No. 9 to about Midhurst, then due north to Buckingham, and finally returning to the English Channel, in a south-westerly direction to a point about Bridport. This would provide for Hampshire, Berkshire, Dorsetshire, and part of Wiltshire. Here again I fear there is at present no available educational centre; but I have no doubt that the worthy Local Secretary at Salisbury, assisted by about twenty colleagues, would prove equal to coping with the emergency.

District No. 11.—Starting again at Bridport, and following the western boundary of No. 10 north-eastwards to Buckingham, then along the southern boundary of No. 6 westwards to Abergavenny, and afterwards due south to Newport, and then across the Severn back to Bridport, a district could be formed of which Bristol, with its newly-established college for the west of England, might well

be the centre. It would include the counties of Gloucester, Oxford, and Monmouth, and parts of Herefordshire, Wiltshire, and Somersetshire, and would be represented by fifteen Local Secretaries.

District No. 12.—The portion of the western boundary of No. 11 passing from the Bristol Channel to the English Channel, would mark off a district consisting of Devonshire and Cornwall and part of Somersetshire. Here again there would be plenty of scope for the organizing powers of the twenty-one Local Secretaries who would constitute the Committee.

I feel that an apology will be due from me before I proceed further and make any suggestions respecting the organization of the Northern Kingdom. I do not doubt that there are Scottish friends here more capable than myself for the task, and quite willing to take the work in hand if it requires to be done. My plea must be that what I venture to say in respect to Scotland, as well as England, is purely suggestive.

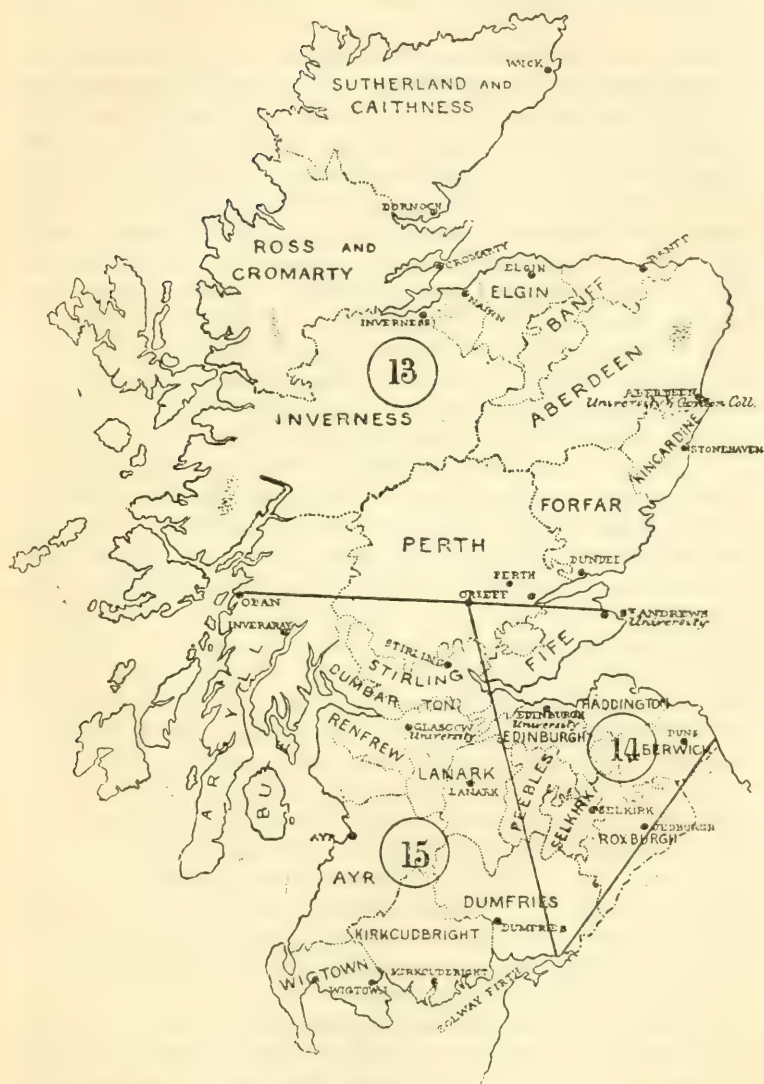
I think that the whole of Scotland might be divided into three districts, one covering a much larger area than the others, but not so densely populated.

District No. 13.—This district might be defined by a line drawn from St. Andrews, where there is a university, on the east coast, right across the country to Oban, on the west coast. It would include the whole of the country north of Perth, and in Aberdeen would include one city at least that understands the organization of education. There are ten Local Secretaries in the district.

District No. 14.—A line drawn from Crieff, on the southern boundary of No. 13, so as to pass east of Stirling and strike the coast about the mouth of the Solway, would divide the remainder of Scotland into fairly equal parts. The eastern division would of course include Edinburgh, and doubtless, as in past years, the local representatives of the Pharmaceutical Society would be able to make advantageous terms with the university professors for the attendance of pharmaceutical students at their classes. The Local Secretaries are nine in number.

District No. 15.—The western division would probably adopt Glasgow as a centre, and there again there is a university that might be utilized to some extent. There are ten Local Secretaries in this district available for a Committee.

It will have been noticed, perhaps, that I have omitted from the proposed divisions a considerable area around London. This I consider to be already provided for in the way of education, which is the subject that I am discussing on the present occasion. There is



MAP OF SCOTLAND.

no reason, however, why the Local Secretaries of the Home District should not also form a Committee to deal with pharmaceutical matters.

As to the financial portion of the problem, it will be evident that at present an estimate pretending to approximate exactness must be out of the question. Any statement made therefore should be looked upon simply as a nucleus for criticism. Speaking first with respect to the expenses of the organizing Committees, the costs of them will depend upon the frequency of the meetings and the distances to be travelled by the committeemen to the places of meeting. This will necessarily vary very much, not only as between district and district, but even in the same districts. Supposing however, that the limit of the expenses of each Committee were limited to an average of twenty shillings per head per annum for each member of it. In that case, since there are only three hundred and fifty places entitled to return Local Secretaries, even if all these Local Secretaries were included in the Committees, the sum required would not exceed £350. Then in respect to the expenses of the educational centres. It may be fairly expected that many of these, when once fairly established, would be self-supporting; others, in disadvantageous situations, would require help. But, taking one district with another, supposing an annual grant in aid of £20 per district were required, the sum total for the fifteen districts would only be £300. The two items together would therefore amount to £650, and this I think would be an outside estimate. Probably a large proportion of this sum is already raised and spent in more or less abortive educational efforts in connection with different associations throughout the country; but if only one-third of it were raised by local efforts, so as to insure the lively supervision of self-interest, I should not be without hope that the Council of the Pharmaceutical Society would see its way to providing the remainder. Certain I am that the funds of the Society might be expended much less profitably than in this way, whilst it does not seem improbable that the greater popularity of the Society, resulting in an increased membership, would make up to a large extent for the expenditure.

At any rate, with such an organization as that I have endeavoured but imperfectly to sketch to take charge of a school, any district could go straight to the Council of the Pharmaceutical Society and claim substantial assistance, and the Council would be only too willing to help; the result being a better understanding and more sympathy between them. And where there is at present

no apparent demand, organization may be the means of galvanizing into some degree of activity many of those the law of whose present existence is apathy.

Perfection may not be within measurable distance, but a gradual improvement in the tone of the candidates for examination, and a sound and healthy development, might fairly be expected. In qualifying for an art which is daily becoming more scientific, some opportunities for the student to acquire sound scientific instruction are imperative, and it would be found that the requirements of the daily practice of his art would react in the most healthy manner upon the scientific teaching.

There always will be found strong men who, in spite of difficulties, teach themselves; but students who have been subjected to scientific training will outstrip these less fortunate comrades, and I believe that the great result of a movement such as I advocate throughout the Kingdom would be a prudent regulating of the average education of the candidates for the examinations.

If we now adopt Paley's definition of education as "comprising every preparation that is made in our youth for the sequel of our lives," we shall still find that the backbone of all true pharmaceutical education is absent unless technical training go hand in hand with scientific teaching, the art being the practical application of the principles of the science.

These are some of the hard peas which the pilgrim pharmacist has to walk on daily; they irritate him and impede his progress. The problem before us is how to soften them. Some would recommend one course of treatment, others a totally different one; but so long as the peas are softened and we score progress, my object in bringing these subjects into some prominence on this occasion will have been accomplished.

At annual gatherings like the present the pleasure with which friend meets friend is sadly marred by the absence of those who can never more take part in our proceedings. We meet in Birmingham, and it is with feelings of sincere regret that I allude to the death of William Southall, who but a few years ago occupied this chair. He had attained a high position in his profession; a man of culture and an accomplished botanist. His death is not only a loss to scientific pharmacy, but society in its more extended sense can ill afford to spare him, and I will add in conclusion "another master mind is summoned from this world-wide council-hall."

Mr. C. THOMPSON (Birmingham), in moving a vote of thanks to the President for his very able address, said it was evident that his remarks on the subject of secret remedies had met with the full approval of the meeting; with regard to provincial education, there could be no doubt that the President was working in the right line, and whether or not the scheme put forward by him was workable at present, there could be little doubt that in a few years some such scheme would have to be introduced in order to satisfy the demand for pharmaceutical education. For his own part, though perhaps this was not the right time or place to go into the matter, he should like to see the same system of localization applied to the election of the Council of the Pharmaceutical Society.

Mr. ARBLASTER (Birmingham) seconded the motion, which was put to the meeting by Mr. H. B. BRADY, as senior Vice-President, and carried by acclamation.

Mr. R. REYNOLDS said he should be prepared on the following morning to bring forward a practical proposition on the subject of formularies.

After the President's Address the reading of papers was commenced with a communication on:—

CRYSTALLIZED ACONITINE.

By JOHN WILLIAMS, F.C.S., F.I.C.

In the British Pharmacopœia aconitine is described as an amorphous alkaloid. And this is the form in which it has been prepared in England for many years, the English alkaloid being distinguished by its being in white lumpy masses, whereas the foreign article was generally sold in the state of powder.

Within the last few years, however, a demand has arisen for the alkaloid in a crystallized state, and consequently more definite and certain in its constitution, and presumably in its medicinal activity. As long as aconitine was solely employed as an external application this was not so important, but now that it is becoming largely used as an internal remedy, it is necessary that its strength and purity should be more accurately defined; in fact, it is of the greatest importance that its strength should be if possible absolutely uniform.

The process described in the Pharmacopœia fairly gives the mode by which the English amorphous alkaloid can be obtained;

but to produce the article in a crystallized state, a few modifications are necessary, and with your permission I will occupy a short space of your time in describing such details of the process as I have found useful.

The *Aconitum Napellus* should be the only source of the root. Other aconites, such as the *ferox*, or Indian, and the Japanese plant, have been used in past times; but we now know, through the labours of Groves, Alder, Wright, and Paul, and many others in England, not to mention other investigators on the Continent, that the various species of aconite do not yield identical alkaloids, as at one time was supposed, and great care should be used to secure roots from the proper plant only.

The root should not be dried at a high temperature, so as to enable it to be finely powdered, but should be brought to the state of coarse powder only; if made very fine it is difficult to work.

The root is to be exhausted with spirit of full strength, say 62° to 64° over proof; if methylated spirit is used, care should be taken that the sample is clean and free from gummy or resinous matters. About 4 ozs. of tartaric acid to each hundredweight of the root should be dissolved in the spirit. More may be used, but I doubt if there is any advantage in doing so.

To exhaust the root, I find it best to employ a combined maceration and percolation process. The maceration should be in the cold, and be maintained for about four days, when the percolation should be proceeded with. I find it advantageous to return the percolate to the root, and allow a second maceration of say a day, then the percolation repeated; and even the maceration and percolation repeated a third time, although wasteful, is I think advantageous. By passing a sufficient quantity of clean spirit through the percolator at the end, the whole of the now very concentrated tincture can be obtained, and the root in this way entirely exhausted with the smallest possible quantity of spirit. The spirit must now be distilled off at the very lowest possible temperature. I have tried spontaneous evaporation, but there are practical reasons why that is not advantageous; but this should be remembered, that all the processes should be conducted at the lowest possible temperature, as subjection to a high temperature for any length of time will injuriously affect the product.

The distillation of the spirit should be stopped before the whole of the spirit has come over, and a little hot water added, and the whole placed in a water-bath gently heated, until the last traces of spirit have been driven off; this frequently takes some hours.

The thin aqueous extract should now be filtered through coarse filtering paper which has previously been damped with water; in this way a quantity of resinous matter is separated, and a clear dark-brown liquor produced which should be distinctly acid to litmus paper. This liquid (in its still acid state) should then be well shaken with an equal bulk of ether, which will dissolve out a small quantity of oily matter, but will hardly if at all **take up any** of the aconitine. The ether should be separated and the aqueous liquid gently warmed for some time, to drive off the last traces of ether.

To this thin aqueous extract should be added a slight excess of concentrated solution of ordinary carbonate of soda, not the bicarbonate, as recommended by some. I do not find it work as well; its solution is perhaps too dilute. The crude alkaloid is at once precipitated, and the liquid should be gently warmed, when, if the process has been properly conducted and the liquid is quite free from spirit and ether, the alkaloid will agglomerate and become a resinous-looking mass, much as quinine does under like circumstances. This mass should be removed by means of a glass rod from the liquid, placed in a small basin, and washed several times with moderately hot water, until the wash water comes away quite colourless. The mass in a short time can be easily powdered and dried by exposure to the air, which is better than drying in a hot-air closet.

The alkaline mother liquor from which the crude alkaloid has been separated, if shaken with ether, will yield a considerable further quantity of alkaloid, but as far as my experience goes not quite identical with that first yielded; at any rate, I have found it incapable of yielding a crystallized alkaloid, and I very much suspect it to be inferior in medicinal activity.

The dried brown crude alkaloid, coarsely powdered, is now to be macerated in pure ether; I mean by that ether which has been well washed, to separate any alcohol which is present in ordinary ether and then dried by means of anhydrous carbonate of potash. This maceration should be done in the cold, and fresh portions of ether used as long as any soluble matter continues to be extracted. The various ethers, mixed and filtered, should be placed in a shallow basin and allowed to evaporate. It is best to assist the first part of the evaporation by means of a hot-water bath, but at a certain point the basin should be removed, lightly covered, and allowed to evaporate spontaneously, when a considerable quantity of crystallized aconitine will be deposited; these crystals can be drained,

and the mother liquor will still continue to yield fresh crops of crystals. The crystals thus obtained are, however, always contaminated with a certain amount of gummy, extractive, non-crystalline matter; this I find can be best removed by digesting the crystals for a very short time in a little very pure and cold ether, in which the gummy matter is very much more readily soluble than the crystals.

By this means, although there is some loss, and the crystals lose part of the sharpness of their angles, they are rendered practically pure, and can be dried on bibulous paper without any difficulty.

I need hardly remind members of this Conference of the series of important papers which have been at various times laid before the meetings by Mr. Groves, Dr. Alder Wright, and others. Still, there appears to be an opening for further investigation upon some points. My attention was directed to this matter by an admirable paper, which appeared in the *Pharmaceutical Journal* of March 20, 1886, by M. Mandelin. In that he recommends that only crystallized aconitine should be used medicinally, in which I quite agree with him, but advises that in the process of making the crystallized article the base should be first converted into nitrate, and from such nitrate the pure crystallized alkaloid afterwards produced.

Now, I have long held the opinion that aconitine is an alkaloid of a very delicate nature, and that it is very undesirable to bring it into contact with reagents of a powerful character, and certainly combining it with nitric acid; and the curious manner in which the alkaloid apparently resists the action of this very corrosive acid has caused me much surprise, and if my idea is correct, we may suppose is liable to produce a change in the alkaloid which may not be advantageous.

Our knowledge of nitrate of aconitine is, I think, mainly due to Dr. Wright, who pointed out, in a paper read before this Conference, that the alkaloid could be readily converted into a nitrate, and by such means its purification much facilitated. To effect this object the ethereal solution of the aconitine should be evaporated to dryness, and the alkaloid dissolved in a small quantity of dilute nitric acid, and then a large excess of much stronger nitric acid added, when, in a short time, the whole becomes an almost solid mass of nitrate of the alkaloid. This should be subjected to pressure, and the salt washed several times with diluted, but rather strong acid, pressing out as much mother-liquor, and with it impurity, as possible between each washing.

In this way a quantity of nearly white and pure nitrate of aconitine (but of course contaminated with a considerable excess of acid) can be obtained. This nitrate of aconitine, when dissolved in warm water and allowed to evaporate spontaneously, crystallizes in rather dark-coloured rosettes of great beauty, apparently consisting of flat prisms radiating from a centre. To reproduce the aconitine from the nitrate, it is only necessary to dissolve in water, and precipitate with carbonate of soda in slight excess; the precipitate should be slightly washed and dried, then treated with successive portions of pure ether in the cold, until quite exhausted, and the ethereal solution so produced allowed to evaporate spontaneously.

Again the crystals which form round the edges of the beaker or basin will be contaminated with non-crystalline gummy matter, and can be purified in the same way as mentioned before, but the great bulk of the ether deposits a mass of very white light crystals which appear to require no further purification.

Unfortunately the quantity of crystallized aconitine produced, either directly or by the intervention of nitric acid, is very small, and it is necessary to work upon considerable quantities of root to obtain very tangible results.

Now as a mere matter of speculation the question arose, if the alkaloid produced directly by the process I have first named, which I may call the normal alkaloid, more nearly approaches the alkaloid as contained in the living plant than that produced by the second or nitric acid process? It was with a view of settling that question in my own mind, that I thought of examining the two products microscopically.

Here I must thank my friend Mr. Waddington for his kindness in making me a number of slides of various stages of manufacture. He is well known for his great skill as a microscopist, and his success in crystallizing chemical substances generally places me under a very special obligation to him.

I believe that I am allowed to mention that the crystallization of the aconitines has in all cases been from alcohol and not from ether, and that somewhat dilute alcohol is better suited for the purpose than very strong.

The crystals of aconitine when examined under the microscope with, say $\frac{1}{4}$ -inch power, and polarized light, are very beautiful. The aconitine made directly (normal) especially yield crystals of great interest; they appear to be very thin flat prisms with pointed ends, reminding one of the polygonal figure around which

chemists figure the position of meta, para, and ortho groups of molecules. The aconitine produced from the nitrate, on the contrary, although crystallizing with great readiness, does not apparently produce crystals of this form, but only confused, ill-defined, small groups of prismatic crystals, radiating from a centre, but very frequently so confused and ill-defined that it is very difficult to assign an exact figure to them. Now this result occurred not once, but many times; in fact, it has been found impossible to obtain any crystals from No. 2 alkaloid exactly like those produced by the normal aconitine. The slides under the microscope will, however, better illustrate my meaning than anything I can say, and I exhibit the normal aconitine, the aconitine recovered from the nitrate, and also the nitrate of aconitine itself, which is not only very curious and instructive, but also very beautiful as a polarizing object.

The normal crystallized aconitine (or that which had not been subject to the action of nitric acid) was kindly examined physiologically by Dr. Stevenson. He found that the $\frac{1}{3000}$ th of a grain killed a mouse in twelve minutes, and states that it is in his opinion one of the most powerful lethal preparations he has ever examined.

I have since sent him some of the alkaloid recovered from the nitrate, but he has not yet given me any report as to its physiological action.

I feel I must apologise for having taken up your time with a subject on which so much has been written, and by authorities so eminent, that I can only regret that I have been able to do so little towards settling some of the important practical questions involved in the production of crystallized aconitine.

In conclusion, it may be interesting for me to mention that I have examined microscopically a considerable number of specimens of crystallized aconitine made by other experimenters, and have been astonished at the great variety of forms the crystals assumed. I think I may say no two gave exactly identical results, but every sample differed from every other. Why this should be I do not know, and it is evident we have still much to learn as to the roots used, and the exact mode of operation employed.

At the conclusion of the paper, Mr. WILLIAMS said, that owing to the warmth of the weather the microscopic slides which he had brought had become damaged, but Mr. Waddington had kindly

sent him some fresh ones, which he should be happy to show to the members afterwards.

The PRESIDENT having proposed a vote of thanks to Mr. Williams,—

Mr. T. B. GROVES said this subject was not a new one to him, for some twenty years ago he produced samples of nitrate of aconitine, and also crystallized aconitine uncombined with acid, and recommended then that the crystals, as a definite body, should take the place of other forms of aconitine. He was pleased to find that Mr. Williams, who then seemed rather doubtful as to the crystals produced being true aconitine, had now come round to his own view that this was the only proper form for use in medicine. At present they were almost entirely dependent upon the French for this crystalline aconitine, Duquesnel being the chief maker, who obtained a very large price for it. He thought it was not surprising that there should be differences in the form of the crystals obtained, as they all knew how important an influence slight differences of temperature, rapidity of evaporation, and the presence of other salts in the liquid, had on the shape of crystals; besides which, aconitine was a very complex molecule, and very liable to modification. The most serious point to be noticed was the occasional presence of crystals devoid of poisonous properties. Some time ago, when working on a considerable quantity of what was supposed to be *A. Napellus*, he obtained $1\frac{1}{2}$ ounce of crystalline matter, which under the microscope presented a slightly different appearance to previous specimens, and on repeating the process of crystallization he managed to separate two entirely distinct bodies, one of which was entirely devoid of toxic properties, the other being the ordinary alkaloid. It was very important to be able to separate this non-poisonous body from that which was so extremely poisonous, but at present he did not know of any satisfactory means of accomplishing this. Dr. Alder Wright had since examined this non-poisonous alkaloid carefully, and given it the name of pieraconitine. He (Mr. Groves) thought possibly it was the same alkaloid as Mr. Broughton had discovered in the *A. heterophyllum*; but Dr. Wright said no, it was a distinct alkaloid. Some time afterwards Mr. Cleaver, in making extract of aconite from the green herb, found that the product was non-poisonous and had no effect when taken into the mouth. Mr. Cleaver then examined it for alkaloid, and asserted that he found

it to be precisely the same alkaloid as he (Mr. Groves) had got from the supposed root of the *A. Napellus*, but on pursuing the subject a little farther, Mr. Cleaver was at last convinced that the plant he had been working on was *A. paniculatum*. This remark had not been verified by other investigators. It seemed very desirable that the Conference should arrange for the growth of some true *A. paniculatum*, and endeavour to isolate from them this picroaconitine. He had nothing to add to his views on aconitine as given some three years ago, but did not think it was necessary to use tartaric acid and bicarbonate of soda instead of hydrochloric acid and ammonia; he used the latter reagents, and proceeding cautiously, never had any difficulty in producing crystals to the extent of about a third of the whole yield of alkaloid. He always separated the aconitine as nitrate, which he maintained was the proper way. From that nitrate crystals of aconitine could be got without modification.

Mr. LONG said this was an eminently practical paper, in which all could take an interest. He should like to know whether the cultivation of this plant would impair its usefulness for preparing aconitine from. The general experience of chemists was that they got a confused mass of these roots, and it was very difficult to determine which species they belonged to. It seemed to him that the percolation and repercolation would have a tendency to cause re-absorption of the active principle. He should think also that distillation *in vacuo* would be desirable.

Mr. E. M. HOLMES said he had paid considerable attention to the genus *Aconitum*, and he found on looking up the literature of the subject that there were at least twenty-four varieties of *A. Napellus* known to botanists. Under these circumstances it seemed to him that the difficulty in obtaining a collection of roots of one uniform character would be very great, even if it were possible at all in commerce. He therefore thought Mr. Groves's suggestion, that a typical form should be cultivated in sufficient quantity for the alkaloid to be prepared from, was a very excellent one; he should be glad to do what he could in this way, and Mr. Shenstone, of Colchester, had promised to assist him. They would set to work as soon as they knew the quantity required for preliminary experiments.

Mr. WILLMOTT said the Conference was much indebted to Mr. Williams for giving the results of his experience, especially as he did not see his way three years ago to agreeing with Mr. Groves that crystallized aconitine only should be used for internal

administration. The British Pharmacopœia gave no dose for aconitine, and therefore it was presumably not intended for internal use. It was a very powerful agent, not only in the crystallized, but also in the amorphous form, which Mr. Williams formerly advocated, as he could vouch from personal experience. Some time ago, when suffering from a severe attack of neuralgia, having read in a medical work that no neuralgia could resist aconitine, he tried some of the amorphous form, which had been in the house some years, making up $\frac{1}{400}$ gr. in two small pills. He got on very well for two or three days, but on increasing the dose on the third day by one pill, equal to about $\frac{1}{1000}$ of a grain, symptoms came on which induced him to abandon the treatment. He quite agreed with Mr. Williams that uniformity was the great point to be achieved; if that could be done, aconitine would be largely prescribed, and would form a very efficient remedy.

Mr. UMNEX remarked that the researches of Dr. Wright, Mr. Groves, and others, showed the various kinds of aconite root which were in commerce when their researches were made. There were large quantities of Indian aconite root at one time, which was supposed to be derived from *A. ferox*, and when that was disposed of the Japanese came in for some time; but at present they were almost dependent on German sources. There seemed great difficulty in obtaining anything like an adequate supply of the official root, and he thought the only way would be to cultivate in this country either it or the *A. paniculatum* or other varieties.

Mr. GROVES said the roots operated upon were sold as *Aconitum Napellus*, but the operators had no means of identifying them, and could only accept the statements of the importers.

Mr. UMNEX said the roots of the *A. ferox*, or Indian aconite, were present in considerable quantities some twenty years ago; but none of it was now seen in the London market. Then for some five or six years the market was flooded with Japanese root, but that was now absent. The Indian root was probably produced from one plant only, but that from Japan was unquestionably a mixture of several kinds. Aconite was cultivated in Cambridge-shire and other parts of England.

The PRESIDENT said he was employed for a long time, some years ago, in making sections of aconite root, and he found that the aconites of commerce were much mixed. One particular kind of which he wanted to get the root, he was utterly unable to obtain in England, but got it through a friend in Prague. He was much surprised to hear from a gentleman who was engaged in the inves-

tigation of aconitine, that he had examined that particular aconite, and did not find any alkaloid in it; and on inquiring further, he found he had obtained his material from a wholesale house. It appeared to him that in such investigations the roots themselves should be operated upon, not extracts obtained from wholesale houses. Their knowledge of the aconites would be very much increased if experimenters would take the trouble to make sections of the root, and ascertain if it was really *A. Napellus*, and there was not much difficulty in doing this. If $\frac{1}{3000}$ grain of aconitine were fatal to a small animal, and there was any uncertainty about its composition, it was not yet an article which could be satisfactorily used in medicine.

Mr. A. W. GERRARD said he could corroborate from his own experience much of what Mr. Williams had said, especially with reference to the necessity, where methylated spirit was employed for the extraction of the alkaloid, of adding a certain proportion of tartaric or some weak acid. It was not so necessary to do this where rectified spirit was used; but if methylated spirit were distilled, an alkaline residue would be found. It was also very important to stop distillation before all the spirit was removed, for a large proportion of alkaloid was easily destroyed if evaporation were carried too far, especially if the temperature were high. He would ask Mr. Williams if the syrupy matter which he separated from the crystalline aconitine by maceration in cold ether was alkaloidal. He found that, as a rule, treatment with nitric acid in these processes in the slightest excess caused a considerable destruction of alkaloid. He reprecipitated with subcarbonate of soda or ammonia, considering them better for aconitine than caustic potash or soda. He happened to be in possession of a portion of Mr. Cleaver's make of crystalline aconitine, and a very fine specimen it was. Dr. Ringer had experimented with it, and found it extremely active. Turning to another point, it seemed to him the first thing to be aimed at was to obtain a definition of aconitine, which at present did not exist. It seemed to be one of a class of alkaloids which it was difficult to define; but his argument was that it did not matter from what source it was obtained, whether from *A. Napellus* or *paniculatum*, from India, Japan, or Germany, if it were strictly and accurately defined. It was another thing when dealing with pharmaceutical preparations, but if aconitine were a well-defined substance, it did not matter where it came from.

Mr. ALCOCK asked if Mr. Williams could state the effect of

ordinary chemical reagents on the amorphous and crystallized aconitine respectively. With regard to the official aconite root, he remembered twelve months ago he had occasion to attempt to obtain some genuine samples, such as could be placed before students, but found very great difficulty in doing so. Parcels were sent of *A. Fischeri*, and also of *A. ferox*, but he could not get the real English aconite. He got German *A. Napellus* roots, but on breaking them they failed to give the characteristic fracture mentioned in text-books, the roots being in such bad condition, and he feared an investigation would have failed to obtain aconitine from them in any form. He hoped that aconite would be more largely grown in England for medicinal purposes.

Mr. JOHN MOSS said it was very generous of Mr. Williams to put before the Conference with such circumstantiality the process for manufacturing crystallized aconitine. When gentlemen of authority and experience did this they took a most important step towards producing that uniformity which all were looking for in aconitine and other things of similar kind. Most people when they received a benefit were encouraged to ask for more, and he should be glad if Mr. Williams would say what kind of root he used, because they knew that the different roots met with in the market yielded aconitine of very different characters. For example, *A. Napellus* yielded both aconitine and pseudaconitine, whilst *A. ferox* produced a larger proportion of pseudaconitine than of aconitine. He should like to know also whether Mr. Williams succeeded in getting one of these alkaloids only, and that of a pure character. Another question was whether the roots were wild or cultivated; because one authority maintained that the wild plant yielded crystallized aconitine more readily than the cultivated, and also insisted on the use of tartaric acid, as Mr. Williams did.

Mr. BURFORD asked if the gummy matter which so persistently cropped up was not of an alkaloidal character, and might it not be due to a decomposition of the aconitine, in the same way as quinine and other bodies derived from cinchona alkaloids.

Mr. WILLIAMS, in reply, said he thought the gummy matter was alkaloid somewhat changed, probably by oxidation; but he did not think it would crystallize. His contention was that aconitine was so delicate an alkaloid that it changed even in the course of manipulation, and this would account for the different results obtained by different manipulators; but when once obtained in a tangible crystalline form, it could be relied upon. As to the roots

employed, he was quite at the mercy of the wholesale dealers for what he used, and had never been able to obtain roots of a thoroughly satisfactory character, which he could say were absolutely of one species. It would be a very great advantage if they could obtain roots which could be relied upon as being really of the species desired. As Mr. Holmes had pointed out, there were several varieties of *Aconitum Napellus*, and crossed varieties might be produced unless the plant was carefully watched. He could not agree with Mr. Gerrard that it did not signify what root you started with, and that the aconitine, when isolated absolutely from any other bodies, would be identical, whatever species it was made from. He thought the alkaloids produced, even when crystallized, were distinctly different, and in this he agreed with Mr. Groves and other investigators. He had been astonished at the varying shapes of the crystals under the microscope, but the same sample of aconitine always yielded crystals of the same form, which showed that there was something more than mere accident in the matter, or variations in the temperature and strength of solution. Mr. Williams then drew on the black-board some of the forms most frequently met with, and stated that one variety, with a cubical form of crystal, appeared to be inert. The paper was only suggestive, and his idea was that the first step was to get a definite root, and next to get a definite process, so that the results could be compared. By proceeding in that way they would be able in time to arrive at some accurate knowledge of aconitine.

The next paper read was on—

CERTAIN DERIVATIVES OF HYMENODICTYONINE.

By W. A. H. NAYLOR, F.C.S.

In continuing my study of the alkaloid hymenodictyonine, my latest efforts have been directed towards gaining some knowledge of its behaviour when acted upon by iodine, bromine, and oxidizing agents. An outline of the working details and the results obtained are supplied by the following paragraphs.

On gradually adding a weak solution of iodine in ether to an ethereal solution of the alkaloid, the iodine became decolorized and a deep orange-red precipitate was formed, which quickly agglutinated and presented the appearance of a black resinous mass. By continuing the addition of iodine until it ceased to be decolorized, an excess could readily be recognised. The resultant varnish-like

mass was washed freely with ether, in which it was but little soluble, and then treated with hot alcohol. It was soluble to a considerable extent in cold alcohol, but its solubility increased with increase of temperature. It was hoped that by the use of a limited quantity of this solvent, acting on the compound at a suitable temperature to be ascertained by experiment, followed by a gradual process of cooling, a crystalline derivative would separate out. The expectation was not realized, for the substance that separated under these conditions was always amorphous.

The experiment was next tried of adding iodine in large excess to a solution of the alkaloid in much ether. This had the effect of producing a more flocculent precipitate at the moment of its formation, but toward the end of the reaction the several particles began to coalesce. This viscid mass was treated precisely as the previous one, and refused to be coaxed into crystallizing.

A third attempt was made by precipitating a weak solution of the alkaloid in ether, with rather less iodine than would be required to produce complete precipitation. The precipitate was subjected to the same treatment as the previous ones, and resembled them in the granular appearances of their separations from alcohol, notwithstanding the inducement to assume some definite form offered by the varying temperatures to which they were subjected.

Although, after much labour and thought, I have failed to obtain an iodo-derivative in a crystalline form, I do not regard it as one of those organic principles to which the faculty of crystallization has been denied, but believe that a more perfect knowledge of the conditions of its formation in a state of purity would lead to its production. This belief is encouraged by a close correspondence to a possible formula which may be assigned to the iodo-compound, prepared by the method last described, that of incomplete precipitation. That portion of the viscid mass which dissolved in a limited quantity of hot alcohol and separated out on cooling, gave, in a series of iodine determinations by combustion with quick lime, the equivalent of 47.52 per cent. The formula $(C_{23}H_{40}N_2)_2I_3 \cdot 2HI$ would require 47.92 per cent. of iodine. Throughout these combustions it was observed that a fatty-looking substance distilled over, having the characteristic odour of naphthalene. From solution in alcohol it crystallized in white scales.

Several attempts were made to produce a crystalline bromo-derivative, but without success. The flocculent precipitate which resulted from the reaction of ethereal solutions of bromine and alkaloid, after treatment with hot alcohol gave on cooling a granu-

lar looking body, which was chiefly remarkable for the facility with which it parted with a portion of its bromine. A stable and definite compound was not obtained.

The action of oxidizing agents on the alkaloid next claimed attention. The alkaloid was converted into sulphate, and to its aqueous solution was gradually added a one per cent. aqueous solution of potassium permanganate, until the liquid became permanently coloured. It was then concentrated by distillation to a low bulk, and filtered. The filtrate was neutralized with sulphuric acid, and evaporated to dryness. The residue was exhausted with hot alcohol, which on cooling gave a deposit, and when quite cold was filtered. The filtrate was evaporated, taken up with water and converted into a silver salt, which was decomposed by sulphuretted hydrogen. Filtration, evaporation, and subsequent purification of the residue with alcohol and water, left a feebly coloured acid having the following properties :—

It was markedly acid to litmus, and had a bitter after-taste. It dissolved readily in alcohol and water, and was but little soluble in ether. It united both with bases and acids. Its hydrochloride in aqueous solution, when evaporated over sulphuric acid, assumed an arborescent crystallization; the platinochloride under the same conditions crystallized in plates or prisms. The acid was not precipitated with sulphate of copper, but gave with nitrate of silver a white gelatinous precipitate, which in the moist state became rapidly reduced on exposure. Lead acetate gave a white granular precipitate. Two determinations of the platinum in the platino-chloride dried at 115° C. gave 29.50 per cent. of platinum. The formula $(C_6H_5NO_2HCl)_2PtCl_4$ requires 29.72 per cent. of platinum, and this is the platino-chloride of a pyridine-monocarboxylic acid, viz., $C_5H_4N.COOH$. Further, the acid, or one of its salts, when distilled with lime, yielded as a product of decomposition a volatile base which possessed the peculiar odour and general properties of pyridine. This property of the acid, coupled with its behaviour towards reagents, and the percentage of platinum in its platino-chloride, may be accepted as trustworthy evidence of its being a carboxylic derivative of pyridine. If nitric acid be used in place of potassium permanganate, the same acid is obtained.

It would, therefore, appear that, in common with the rest of the non-oxygenated alkaloids, hymenodictyonine is constitutionally related to pyridine.

The PRESIDENT having proposed a vote of thanks to Mr. Naylor for this paper, which evidently represented a large amount of work,—

Mr. ALCOCK said this principle was obtained from a largely used febrifuge, *Hymenodictyon excelsum*, of which an Indian doctor told them two or three years ago at a pharmaceutical meeting in London. As the drug was considered to be valuable in medicine, it would be well to know what was the best solvent for the active principle.

Mr. NAYLOR said he did not know of any single solvent which was capable of removing the whole of the alkaloid from its combination with the bark; but alcohol was the best. He had retained a considerable portion of this alkaloid, with the view of placing it in the hands of some eminent physiologist, and now that its chemistry had been fairly studied, he hoped they might soon know something about its physiological action.

The Conference then adjourned for luncheon.

On resuming, the next paper read was on—

THE ASSAY OF ELATERIUM.

By H. W. JONES, F.C.S., AND F. RANSOM.

On the publication of the new British Pharmacopœia last year, we found, independently of each other, that the method given for assaying elaterium was quite unworkable; and attention was directed by one of us to the fact. Since then we have had occasion to work out a practicable method of assay, the results of which we now record.

Under "Elaterium," the Pharmacopœia says: "treated by the method described for 'elaterin,' it should yield 25 per cent., or not less than 20 per cent., of that substance." The process given for the preparation of elaterin consists in "exhausting elaterium with chloroform, adding ether to the chloroformic solution, collecting the precipitate, washing the latter with ether, and purifying by recrystallization from chloroform."

The *Pharmacographia*, from which the process has been adopted, states that the best method of obtaining elaterin is by exhausting elaterium with chloroform; and that from a solution so obtained, "a white crystalline deposit of elaterin is immediately separated by addition of ether."

As a matter of fact, ether does not precipitate elaterin in any quantity from a chloroformic solution of elaterium, even when added in very considerable excess; and the same is true of a solution of pure elaterin.

In order that even a small amount of elaterin may be thrown out of solution by ether, the chloroformic solution must contain a large proportion of the active principle, and a great excess of ether must be added. With a weak chloroformic solution, the addition of ether fails to effect precipitation, as the following experiment will show.

An amount of crystalline elaterin weighing 0.226 gram was dissolved in 10 c.c. of chloroform, in a stoppered bottle, to avoid evaporation; and pure ether gradually added. When 90 c.c. had been used, the solution was still perfectly bright. No further addition of ether was made, and after twelve hours no elaterin had separated.

A useful assay process may, however, be based upon the use of chloroform and ether, if, instead of adding ether to the chloroformic solution, we operate upon the dry residue from the same after evaporation. Working in that way, we have found certain precautions necessary to obtain constant results. The dry residue from the chloroformic solution requires to be well washed with ether to free it from colouring matter and other impurities; and unless that part of the process be efficiently done, the weight of the product will vary greatly. The following experiment was made with a view of determining the amount removed in various stages of washing. The residue from a chloroform exhaustion of one gram of elaterium, treated with ether in a dish so as to break up the mass, was transferred to a miniature percolator and washed with successive small amounts of ether, and the residue after evaporation of each 5 c.c. weighed.

1st	5 c.c. gave	·144 gram.
2nd	„	·030 „
3rd	„	·012 „
4th	„	·010 „
5th	„	·006 „
6th	„	·004 „

The ether was passed slowly through, and the washings were comparatively colourless when the third 5 c.c. had been obtained; but the residue from the same was decidedly coloured.

Even after washing till ether passes through the elaterin colourless, we find that the white, or nearly white product will still give a

coloured solution when redissolved in chloroform. On that account we prefer to redissolve in chloroform, evaporate, and wash with ether for the second time.

Another source of error lies in the amount of elaterin removed by solution in ether, aided possibly by the presence of various other matters held in solution. Pure elaterin is not nearly so soluble in ether as has been recorded, yet a notable amount is removed in process of washing. The United States Pharmacopœia, which does not include elaterium, but embraces elaterin, gives the solubility in ether as 1 in 290, which appears to be the determination of Hennel (*Journ. Royal Inst.*, i. 532; and quoted by Gmelin, "Chemistry," xvii. 335).

From an examination of various samples of elaterin prepared by ourselves in different ways, and from a sample purchased from a well-known continental manufacturer, we have arrived at the conclusion already stated as to solubility, and cannot accept the figures given by Hennel. It must be remembered that the presence of even one per cent. of an impurity more soluble in ether than elaterin itself, would decidedly affect the figure for solubility. We reserve further remarks on solubility until we have operated upon a sample of proved absolute purity. Not only have different figures been given for the solubility of elaterin, but its reactions have been differently recorded, showing that products of varying purity have been operated on by various observers. Thus Power (1875), in common with some other writers, stated that elaterin is *instantly* coloured red by sulphuric acid, whilst Lindo (*Chemical News*, xxxviii. 35; *Year-Book of Pharmacy*, 1878), who introduced the carbolic acid test, found that no characteristic coloration was produced by sulphuric acid alone; and this is in accordance with the recent work of Johansson (*Zeit. Anal. Chem.*, xxiv. 154), who finds that with concentrated sulphuric acid it gives a pale yellow coloration, becoming red at the edges after some time, and ultimately cherry-red. The elaterin obtained by the assay method which we have adopted, also gives no immediate red coloration with sulphuric acid, but instantly responds in the most minute amounts to the carbolic test, showing it to be a practically pure product.

The British Pharmacopœia thus describes this test for elaterin: "With melted carbolic acid it yields a solution which, on addition of sulphuric acid, acquires a crimson colour rapidly changing to scarlet."

Elaterium may be exhausted with alcohol; but we greatly

prefer chloroform for the purpose. Complete exhaustion can be effected in the cold; for after passing about 10 c.c. of extra chloroform through the powder after that solvent had begun to drop in a colourless condition, it was found that no elaterin was obtained from further amounts of percolate with *boiling* chloroform, as no reaction could be obtained with the carbolic acid test applied to the dish in which the percolate of the boiling chloroform had been evaporated.

F. B. Power (*American Journ. Pharm.*, Jan. 1875) employed alcohol for exhausting elaterium and precipitated the elaterin by means of potassic hydrate. The concentrated tincture is poured whilst still warm into a dilute solution of the alkali. By that method he only obtained 14 per cent. of elaterin. The potash test employed in the 1867 Pharmacopœia has been wisely discarded by the editors of the new edition, but is still the official process of the Italian Pharmacopœia (1881).

As evidence of the extreme unreliability of the potash test, we quote two experiments made under somewhat different conditions as to bulk and temperature.

(1) Exhausted 1 gram with rectified spirit, evaporated to the consistence of a syrup and added to 30 c.c. of liquor potassæ, slightly warmed. The precipitate collected next day weighed, when dry, 0.151 gram = 15.1 per cent.

(2) Exhausted 1 gram in an exactly similar manner, evaporated to about 5 c.c., and added 60 c.c. of hot liquor potassæ. The precipitate collected next day weighed only 0.028 gram = 2.8 per cent.

The potash test was proposed by Morries in 1831; and Buchheim (1872) found that elaterin was decomposed by potash when added to a hot alcoholic solution.

The following is a detailed description of the method of assay finally adopted by ourselves:—

Macerate 1 gram of finely powdered elaterium with chloroform in a covered dish for a few hours, transfer to a miniature glass percolator (*e.g.* the barrel of a small glass syringe) plugged with wool, and wash with chloroform, allowing about 10 c.c. to pass through the marc after the menstruum has begun to pass in a colourless condition. Place the percolate in a small dish, and evaporate off the chloroform at a gentle heat. Treat the residue with a small quantity of pure, absolute ether, and transfer to a small percolator or funnel, plugged with cotton wool. Wash with pure ether until at least 10 c.c. have passed through colourless, and reserve the ethereal washings. Redissolve the elaterin so

obtained by passing chloroform through it whilst still in the funnel or percolator, and evaporate the chloroformic solution once more to dryness in a small dish. Treat the residue so obtained with ether, exactly as before.

Allow the united ethereal washings to evaporate *spontaneously*, until the bulk is reduced to about 3 c.c. Transfer to a small cylinder (e.g. a 10 c.c. measure), and allow the separated elaterin to deposit. Carefully decant the coloured supernatant ethereal layer, add 4 c.c. of pure ether to the residue, and again decant after deposition has taken place. Finally, dissolve the elaterin in the cylinder with the aid of chloroform, and wash out the larger amount previously collected in the funnel with the same solvent. Unite the chloroformic solutions, evaporate at a gentle heat in a tared dish, dry on the water-bath, and weigh. In a trial experiment, we found elaterium recovered from the ether-washings equal to 1.9 per cent. A small amount will still be retained by the final small bulk of ether; and this, as far as we have been able to make out, will be equivalent to about 7 milligrams, indicating 0.7 per cent. more elaterin to be present in the sample than actually found; and that amount may be added by way of correction.

Attempts to improve the process by the employment of benzene, and of petroleum ether in place of ordinary ether, did not furnish any promising results. Both solvents remove colouring matter from the chloroformic residue to a certain extent only, and a final washing with ether is necessary. Owing to the solubility of elaterin in alcohol, it is important that the ether employed should be free from that impurity, and throughout our experiments absolute ether has been used.

The standard of the Pharmacopœia of 1885 is 25 per cent.; and elaterium, it is stated, should not contain less than 20 per cent. of elaterin. The former amount represents in our opinion a fairly good article, whilst the latter indicates too low a percentage. A sample prepared by one of us in the season of 1885 yielded 29 per cent. when assayed by the method described.

In conjunction with the solubility of elaterin we hope to furnish on a future occasion some particulars of a chemical examination of the same substance.

The PRESIDENT, having moved a vote of thanks to the authors,—

Mr. WILLIAMS said the process he had followed in extracting elaterin involved the use of caustic potash, in which elaterin was

insoluble and remained undecomposed, whilst most of the colouring matter which accompanied it was decomposed. It was, therefore, the general practice to use caustic potash as a purifier, and afterwards to take up the elaterin by chloroform or alcohol.

Mr. JONES said Mr. Ransom and he had found the potash process given in the Pharmacopœia of 1867 so unreliable that they discarded it altogether. They simply powdered up the elaterium and exhausted it directly with chloroform, and then operated directly on the residue with ether; but after washing it completely with pure anhydrous ether, and after every trace of colouring matter had been removed, they still found it necessary to redissolve in chloroform, because a certain amount of colouring matter and impurity still remained after the first washing.

Mr. ALCOCK asked whether it would not be advisable to first wash the elaterium with ether, to remove the chlorophyll and resinous matters, and then afterwards to treat the washed material with chloroform. He understood the process adopted was just the reverse of that.

Mr. JONES said this would involve the use of a very much larger amount of ether, besides which ether did not act so readily on elaterium as chloroform did. It could be exhausted readily with chloroform, but the bulk of it would scarcely be touched by ether.

Mr. LASCELLES SCOTT asked if the authors had tried to remove the colouring matter, and some resinoid matter with which the elaterin was associated, by treating the elaterium in the first instance with bisulphide of carbon, and then exhausting it with chloroform.

Mr. JONES said they had tried bisulphide of carbon amongst other things, and found no advantage in it at all. It removed a small amount of colouring matter, but only that which would be removed otherwise.

The next paper read was on—

A FALSE PAREIRA BRAVA.

BY WILLIAM KIRKBY, F.R.M.S.

The history of pareira brava, from its first introduction into Europe in the seventeenth century down to the present generation, is one curiously burdened with mistakes and complications. It is not my intention to recapitulate the historical account of this drug

which has been so concisely and lucidly given by Hanbury in his well-known paper on this subject (*Pharm. Journ.* [3], iv., pp. 81 and 102). We are, however, indebted to Hanbury for something of more value than its history, and that is the determination of the botanical source and characters of the original *pareira brava*. It falls to my lot to have to chronicle another chapter in this unique history of errors, and, at the same time, to prevent, if possible, the occurrence of some similar mishaps in the future. I say *some*, because it is perhaps too much to expect that henceforth *pareira brava* will have a clean and untarnished reputation, since its career hitherto has been so unsatisfactory.

Hanbury first demonstrated, in the paper referred to above, in 1873, that the true *pareira brava* is the root of *Chondrodendron tomentosum*, Ruiz et Pavon, and at the same time indicated how it differed from the substitutes then in the market.

Before proceeding to discuss the particular substitute forming the subject of this paper, we will consider those that have preceded it.

As is well known, for a hundred and twenty years the plant producing *pareira brava* was said to be the *Cissampelos pareira*; but whether the root of this plant ever appeared in commerce before Messrs. Allen and Hanbury imported it from Jamaica is extremely doubtful; this can therefore scarcely be considered a substitute. Hanbury describes a drug which was very bitter and was stated to be the root of *Cissampelos*; and also another which he says was "completely devoid of medicinal power;" this was sold in the place of the bitter false drug. The botanical origin of these two substances is, as far as I know, still undetermined. Besides the foregoing, there are the white and yellow *pareira bravas*; the former being the produce of *Abuta rufescens*, and the yellow of *Abuta amara*. Hanbury thought the latter was identical with a yellow *pareira brava* which, he says, was "marked internally by numerous concentric zones," and appeared in the market in 1873. Stillé and Maisch* record an instance of the appearance of a similar drug; they say: "Recently a yellow *pareira brava* has been met with in commerce, and was imported from Brazil. It consists of flat, often twisted stems, which Bentley and Trimen presumed to be obtained from *Abuta amara*, Aublet. This kind is easily recognised by the eccentricity of the woody zones, and by its bright yellow colour internally." They proceeded to say that Morrison had examined it chemically.

* "National Dispensatory" (1879), p. 1037.

Morrison in his paper * states that "the drug examined was of Brazilian origin, and sent to the United States as 'true pareira brava, obtained from *Cissampelos pareira*;' but it corresponded neither to the description of *Cissampelos* nor of *Chondrodendron*. It consisted of the woody stem of a menispermaceous plant, was covered with a grey bark, and the bright yellow wood was formed of more or less eccentric layers of fibrovascular tissue." These descriptions agree fairly well with Hanbury's, with the exception of the arrangement of the zones. There is therefore some little uncertainty whether the American is the same as the English yellow pareira brava; and if not, which, if either, of them is identical with the *Pareira brava jaune* (*Abuta amara*) of Aublet. The stems of *C. tomentosum* have been largely imported into this country during recent years as a substitute for the root. In America, however, this appears to have been a common practice for many years. Dr. Squibb† says that for twelve or fourteen years prior to 1871 nothing but the stems of true pareira brava had been known in American commerce; but in that year a shipment of the root was imported which he was able to identify as the genuine drug from the plate in Pomet's "*Histoire des Drogues*." Mr. J. Moss (*Pharm. Journ.* [3], iv., 911) in 1874 reported that he had found stems mixed with the root to the extent of an equal proportion; and again in 1876 to the extent of 75 per cent.

In February of the present year, Mr. E. M. Holmes, of the Pharmaceutical Society's Museum, sent me, for examination, a specimen of a drug which had appeared in the market as pareira brava, and was said to be imported from West Africa. It is to this substitute and the means of identifying it so as to distinguish it from genuine pareira brava that I shall direct your attention. But before doing so it is necessary that I should describe the microscopical characters of the genuine drug. This, I believe, has never yet been done. Mr. John Moss has described the microscopical characters of the stem (*Pharm. Journ.* [3], vi., 702), and promised that he would perform the same duty for the root; this promise, I think, still remains unredeemed. As one or two errors have crept into Mr. Moss's paper, I shall refer to it occasionally as I proceed.

The growth of the secondary wood of the *Menispermaceæ* is abnormal in a remarkable degree. In the young plants surrounding the pith is a normal ring of wood with, relatively, broad

* *Amer. Journ. Pharm.*, copied in *Pharm. Journ.* [3], ix., p. 290.

† *Ibid* p. 846.

medullary rays and narrow vascular bundles. The phloem is on the exterior of the xylem; each portion of the soft bast is limited, on the outside by a thick crescent-shaped layer of hard bast fibres. Surrounding this woody zone is the cortex, consisting of several rows of cortical parenchyma and the epidermis. As far as is known, the growth of the primary ring of wood lasts from one to two years. Towards the end of this time the inner rows of the cortical tissue become meristematic, and a cambium is formed; the outer rows, however, remain unaltered. Immediately within this unaltered region, and exterior to the cambium, two or three rows of the soft parenchyma become converted into rows of hard sclerenchymatous cells, which form a more or less continuous ring. An inner portion of the cambium also becomes converted into a similar ring. Between these two rings is produced a fresh zone of vascular bundles. After some time the cortical tissue again becomes active, and the formation of sclerenchymatous ring and vascular bundles is repeated.

Having obtained a general idea of the structure of the stems of the *Menispermaceæ*, we may now fill in the details and take the stem of *Chondrodendron tomentosum* as an example. In a section having a diameter of 22 mm. the pith measures 1.5 mm., and occupies a position not quite central. Surrounding this are two, three, or four well-defined zones of woody tissue of variable thickness, the outer zone often being reduced to the appearance of a thick line. These zones are divided from each other by undulating lines of a different colour. The whole is enclosed by a narrow cortical portion.

The pith is composed of polyhedral, almost round, thin-walled cells; in the centre are a number of strongly thickened sclerotic cells, which are either isolated or, more frequently, in groups forming strands, the cells being elongated vertically, and are in some instances ten times the length of their diameter. A small quantity of starch is present in some of the cells; numerous small crystals of calcium oxalate are found, especially in the peripheral thin-walled cells; occasionally a cell is seen which contains a brown granular colouring matter. Opposite the apex of the vascular bundles the medulla cells are generally of a smaller diameter, and their walls gradually become thicker as they approach the centre of the pith, until they appear to reach a maximum, and suddenly cease. The woody bundles consist of xylem fibres with oblique slits, and large pitted vessels with transverse slits, tracheides with bordered pits are occasionally

found; the larger vessels are found towards the base of the wedges. At the base of each wedge is a more or less hemispherical mass of thin-walled tissue, the outer part of which is somewhat pressed together; this is what Mr. Moss has called the procambium. It is really the soft bast, and in the zones other than the primary one is all that represents the phloem of the vascular bundles. It is composed chiefly of sieve tubes; the sieve plates lie on the radial walls of the tubes and are only demonstrated with difficulty, as is frequently the case in dried material. I was successful in seeing them with tolerable distinctness by treating radial vertical sections with either strong nitric acid or a solution of iodine. On the exterior of each strand of soft bast in the primary ring is a mass of hard bast fibres; this is not always homogeneous, as sclerenchymatous cells are sometimes mixed with the fibres. The bast fibres are absent from the other zones. The medullary rays are usually from seven to twelve cells thick; the cells are chiefly thin-walled, and tabular in form; those in contact with the wood are always lignified and pitted; occasionally, especially in the older zones, the lignification extends to the neighbouring cells in such a manner as to form bridges from one vascular bundle to another. The rays contain a small quantity of starch, and a large number of crystals. Forming a continuous ring around the tissues already described, is a structure to which Mr. Moss has applied the name of bundle sheath, which I think is somewhat unfortunate, as this term is usually used with reference to the inner limiting row of cells of the cortex; otherwise it is called the endodermis, a structure I have not succeeded in making out in this stem. This ring is made up from three to five rows of stone cells arranged very irregularly; it is broader opposite the medullary rays, into which it branches for some little distance. In the primary ring its continuity is interrupted by the masses of hard bast; in the rings outside the primary one it is separated from the soft bast by two or three rows of thin-walled tissue. From the fact that this sclerenchyma has the same origin as the medullary rays, it would be better to consider it as the pericycle, a structure which has been recognised in the root under the name of the pericambium, and which M. Morot* has shown to be also present in the stem and leaves, it being the outer limiting tissue of the bundle cylinder; this he terms, in whichever organ it appears, the pericycle. Each zone of wood is a repetition of the first, with the exception of the bast fibres, which are absent from all others. The cortex consists

* *Annales des Sci. Nat. Bot.*, tom. xx.

of cortical parenchyma, together with many stone cells, and a narrow band of cork cells. The inner three or four rows of the cortical parenchyma are free from stone cells; and bordering externally on this homogeneous layer are a few scattered groups of sclerenchymatous fibres. A small quantity of starch is found in the pith and medullary rays. Crystals are found in great abundance in the pith and medullary rays, but more especially in the sclerenchyma. Mr. Moss mentions that he observed globoid bodies in the vessels. What he has perhaps mistaken for them are tyloses.*

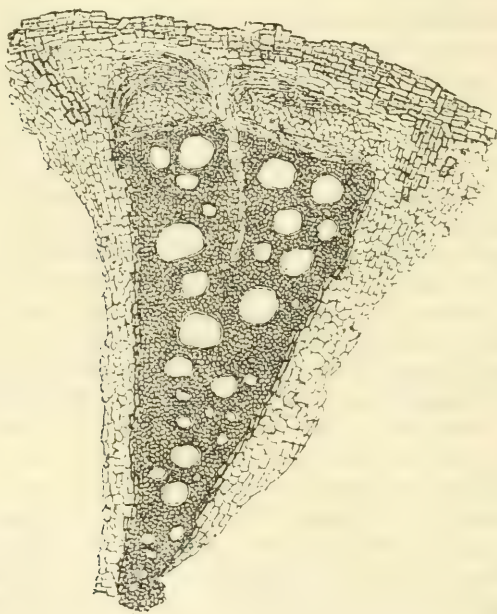


Fig. 1.—Vascular Bundle of the Inner Zone of Root of *Chondrodendron tomentosum*, Ruiz et Pav. $\times 32$.†

True Pareira Brava.—Considering the good descriptions of the appearances of the root of *C. tomentosum* already published, it is unnecessary that I should do more than just remind you that the

* Tyloses, or thyloses, are caused by the growing of the surrounding wood cells through the pits in the walls of the vessels. These cells sometimes divide in the vessel cavity, and so give rise to several cells.

† The woodcuts of this and subsequent illustrations were kindly lent by the Editor of the *Pharmaceutical Journal*.

number of zones of wood is generally three or four; that the internal colour is yellowish or greenish brown, occasionally dark brown, the woody bundles appearing light on a darker ground; also that externally it has a black-brown colour, and has numerous transverse ridges and deep longitudinal furrows. Examined microscopically, it is seen to have no pith. The xylem bundles have the same elements as in the stem; the vessels are distributed in an irregular manner, the larger ones being at the base of the wedges. The diameter of the lumen of the vessels varies from $20\ \mu$ to $190\ \mu$. By measuring all the vessels in an inner and in an outer bundle, we get an average diameter of $108\ \mu$; this is not a constant figure, but it is of some value under certain conditions, as we shall see when we use it for the purpose of comparison. The bundles are distinctly wedge-shaped; those in the primary zone are frequently split at the base by a ray of parenchyma passing inwards towards the pith. Some of the xylem fibres contain a dark brown colouring matter. The outer layers of the bast strands are coloured yellow; the inner layers are open, the individual elements being easily seen. Bast fibres are altogether absent from the root. The medullary rays are considerably broader than in the stem, and the cell walls are much coloured; with the exception of a few cells between the soft bast strands, and which are joined to the ring of stone cells, only those cells which are in immediate contact with the wood fibres are lignified. The rings of sclerenchyma are continuous and narrow, being two or three cells thick. The cortex is narrow and consists of about seven rows of parenchyma, with which are found a few stone cells, and a layer of cork of equal thickness; the cork has a tendency to exfoliate. Starch is very abundant; the granules are usually round or elliptical; other forms are by no means rare, many granules being truncated at one end and much longer than broad. Compound granules are common, and these give rise to the truncated forms. Single granules measure as much as $23\ \mu$; the majority, however, are between $12\ \mu$ and $20\ \mu$. The hilum is generally eccentric and distinct. Crystals are very abundant wherever sclerenchyma is found.

The drug which Mr. Holmes sent me under the name of West African *pareira brava*, and of which I have been fortunate enough to obtain a small parcel in the course of business, is a mixture of several stems and roots. Of these two kinds greatly predominate. I have divided the several kinds into groups, and numbered them consecutively from 1 to 5.

1. This is a stem occurring in pieces varying from about 5 mm. to 25 mm. in diameter. Some pieces are very knobby from the remains of the branches. Externally it is of a chocolate-brown colour and marked by longitudinal furrows; internally the colour is brownish yellow. There is a friable pith which is very eccentric, having in a section of 25 mm. diameter only four zones of wood on one side, while there are fifteen on the opposite side. It is thus seen that the woody zones are very narrow. The woody bundles are also narrow and very numerous, and are but slightly broader at the outer than at the inner end. The vessels are only seen with difficulty with an ordinary lens. In the young stems the tissue of the pith is thin-walled, hexagonal parenchyma; but in older



Fig. 2.—Vascular Bundle of Inner Zone of Root of West African
Pareira Brava. $\times 32$.

stems it is somewhat thickened in a regular manner, there being no strands of very thick sclerotic cells. The vascular bundles in the primary ring having no mass of sclerotic cells, distinguishable from the remainder of the medulla tissue, at their apex, and the spiral vessels being very small, appear to commence rather abruptly. These primary bundles are narrow, and have the larger vessels in a narrow radical row. This is also usually the case in the secondary bundles; but exceptions are not infrequent. The vessels are small. The hard bast is only about six fibres in thickness. The

cortex is almost entirely devoid of stone cells; occasionally a group is seen, and here and there a long solitary, branched fibre. Many of the cortical cells contain a brown colouring matter. The corky layer is very narrow. Starch is very abundant in the pith and medullary rays of the young stems; in the old stems it is absent from the pith. The granules are rather large, more or less round, and frequently compound. Crystals are present in the sclerenchymatous rings and the thickened parts of medullary rays.

2. This is a root, and varies in diameter to the same extent as the previous specimen. It is marked by rather inconspicuous transverse ridges and longitudinal furrows. Externally it has a dark brown colour; internally yellow or brownish yellow. The woody zones are very similar in appearance and width to those of the stem described above; but there is no distinct pith. The primary zone is generally composed of eight or ten narrow wedges of wood, and a corresponding number of broad masses of fundamental tissue, forming a star of reddish yellow set in a ground of pale yellow;



Fig. 3.—Transverse Section of Root of West African *Pareira Brava*.
Nat. size.

sometimes the rays of the star are more numerous. The fundamental tissue divides the bundles of the primary zone from one another completely at the centre, and this under the microscope appears as a sort of pith, in which sclerotic cells are occasionally found. The medullary rays are broad, and consist of thin-walled tissue; there are no lignified cells between the phloem masses. The soft bast is much crowded together. The vascular bundles are narrow, and, with the exception of the primary ones, of nearly uniform width. The vessels are small, the diameter of the lumen varying from 16μ to 72μ , giving an average diameter of 50μ . Thus it appears that they are only about half the width of those of the root of *C. tomentosum*. The cells of the stone rings are small, and only two or three rows deep. There are no bast fibres. The cortex consists of about five rows of cortical parenchyma, and about an equal number of rows of closely adherent cork cells. Starch is very abundant; the granules are round or elliptical; the larger ones measure about 16μ ; compound granules are common.

Crystals accompany the sclerenchyma rings. The general appearance and structure of this root lead me to think that it belongs to the same plant as the stem just described.

3. This stem is very similar in many respects to the first one, but it differs to so great an extent as to warrant a doubt as to its being produced by the same plant. It is possible that variations in the environment may be sufficient to account for these differences; still, the peculiarities are so constant in the material in my hands that I cannot possibly ignore them. Internally it is of a pale yellow colour. The woody zones are broader, nine measuring as much as fifteen in the other stem. The pith is very compact, with a crenate margin. The wedges of wood are broader, and have vessels very easily seen with a lens. The cells of the pith are much thickened, and are pitted; some contain starch, others a brown colouring matter. The cells opposite the vascular bundles are smaller and thickened to a greater extent; sometimes these are only noticeable at the sides of the protoxylem. The primary vascular bundles are broad and short, and have a pegtop shape, caused by there being two, three, or four vessels across the apex immediately behind the spiral vessels, of which there are commonly three arranged in a triangle. It is this arrangement that imparts the crenate appearance to the pith. The bast fibres are very strongly developed, there being eight or ten rows. The cortex contains many stone cells. Many of the parenchymatous cells contain colouring matter. The suberous layer is broader than in the other stem.

4. This may be dismissed in a very few words, as it is true *pareira brava*. Only a small percentage is present. The most probable explanation of its presence is that it has been mixed with the false drug after its importation.

5. This is not of much importance, as I have only found one small piece with a semi-diameter of 15 mm.; but it serves to show the heterogeneous character of the so-called West African *pareira brava*. It is a portion of a root, and has four zones of wood bundles, each of which is of two colours, the inner portion being light brown and the outer dark brown. There is no distinct line separating the zones. The woody bundles are very narrow, and are separated by considerable masses of starch-parenchyma, they cannot possibly be called rays. The most remarkable feature is, that instead of the stone cells appearing in compact rings between the woody zones, they are much scattered and mixed with the parenchyma.

The portions I have numbered 1 and 2 form by far the greater portion of the drug. That marked 3 may possibly be the same as 1; but I am at present inclined to think that it is more likely to be derived from another plant, especially as other roots, such as 5, are present.

It was my intention to have pointed out how the West African drug differs in microscopical characters from the other false pareira bravas; but my paper has already assumed a greater length than I expected, and the general appearances are quite sufficient to distinguish them. I may just say that it is very different from the following specimens which I have, through the kindness of Mr. Holmes, been enabled to examine:—Stem of the bitter false pareira brava; stem of the inert false pareira brava; and stem and root of white pareira brava (*Abuta rufescens*.)

The stem of the West African substitute differs from that of *C. tomentosum* in not having the very characteristic strands of sclerotic cells in the pith; in the smaller diameter of its vessels; in the absence of the great number of stone cells in the cortex. Starch is more abundant in the false stem, and it does not exhibit any long truncated granules. The root differs in having a distinct central point free from wood; in the smaller width and length of the vascular bundles, and smaller diameter of the vessels; in the narrow cork layer being closely adherent, and in exhibiting the same difference in the granules of starch as the stem.

In conclusion, I will summarize the peculiar physical characteristics of this false pareira brava. It has a chocolate-brown colour externally, and a yellow or brownish yellow colour internally. It has a great number of woody zones, instead of three or four. In the larger pieces there is an eccentric arrangement of the zones. The root portions have a star of small size in the centre, with a variable number of straight, not twisted, rays. And, finally, the woody wedges are narrow, and have vessels with a small diameter. These are the most striking characters; and will serve to readily identify the substitute.

The PRESIDENT, in proposing a vote of thanks to Mr. Kirkby, remarked that, being familiar with researches of this character, where the microscope was involved, he could well understand what an amount of labour was required in preparing such a paper. This was an instance in which the microscope might be very valuable in detecting adulteration, substitution, or careless harvesting, by which

one root got mixed with another, or the stems with the roots. It was utterly impossible that any one, even acquainted with the working of the microscope, could follow a paper of this description unless it were accompanied by drawings, as it would be when printed.

Mr. Moss concurred in the remark of the President that this paper represented an immense amount of work. When he worked on the subject, many years ago, he cut hundreds and hundreds of sections before he could find what he wanted, and at the end of the time he was so thoroughly sick of it that if, as stated by Mr. Kirkby, he had promised to do the same kind of work on the root, he was very glad to forget it. He did promise to make a complete chemical examination of the stem, with a view to ascertain whether it was therapeutically as valuable as the root. He commenced, and worked at it for several months, when circumstances prevented his continuing the investigation. Mr. Kirkby must remember that botany, like chemistry, was a progressive science, and its terminology varied to some extent at different times. When he wrote his paper, he applied the names "procambium" and "bundle sheath," because a very high authority used those same terms with reference to the same structures. At that time Sachs' excellent work had just appeared in Germany, and he adopted the terms Sachs used, and the paper itself received the general approval of Professor Flückiger. It was quite impossible to criticise a paper of this kind on simply hearing it, but he was glad to notice that the author had at the conclusion pointed out the characteristics of false pareira. He had not himself met with this kind of false pareira in the market, but it was very useful to have such indications given. At the same time a good deal of pareira which had been described as false, had been in his opinion quite genuine. He was glad Mr. Kirkby had taken up the subject, and hoped he would continue it.

Mr. KIRKBY said in reference to Mr. Moss's paper, he had not intended to criticise it at all, but rather to bring it down to the present state of knowledge.

The next paper read was on—

ULEXINE: ITS EXTRACTION, CHARACTERS, AND TESTS.

BY A. W. GERRARD, F.C.S.,

Teacher of Pharmacy, University College.

The first notice of ulexine appeared in the *Pharmaceutical Journal* of August 7th last, where it was stated that it had been extracted by the author from the seeds of the *Ulex Europæus*, or furze, and proved to be a powerful organic base; a few of its characters were given, and some crystalline salts that had been obtained were mentioned. Since the above communication, a much larger quantity of the base has been made, the method of extracting it improved, its characters, and those of its salts, more minutely examined.

In my first experiments, much of the ulexine was found to have been left in the oily matter of the alcoholic extract, water imperfectly dissolving it, hence the yield was low. With the object of preventing this loss, or recovering the base from the oil, the following experiments were made. Portions of crushed furze seed were macerated in water, acidulated water, and a mixture of equal volumes of alcohol and water; but in each case the mucilaginous matter of the seed gave such viscous mixtures as to render those solvents practically useless, so the experiment was abandoned.

A small portion of the seed was next percolated with petroleum ether, which removed the oil free from ulexine; percolation now being continued with alcohol, the tincture on evaporation gave an extract yielding the base to water, but yielding it more freely to water containing hydrochloric acid. Finding that hydrochloric acid was a good solvent of the ulexine, I determined to try its effect on the oily alcoholic extract, and found that when this is shaken several times with 1 in 1000 hydrochloric acid, the ulexine is completely removed, in a condition well suited for further operations. On the foregoing results the following process is based, and gives at the same time the details of a working:—

Twelve kilograms of crushed furze seed were percolated to exhaustion with 84 per cent. alcohol; the percolate on distillation gave 916 grams of extract, which separated on standing into a porous brittle resin intermixed with much fixed oil. The extract was warmed and well shaken with six successive litres of 1 per 1000 hydrochloric acid; the separated mixed acid fluids were

carefully made neutral with sodium carbonate, filtered, and evaporated to one litre. On setting this aside for twenty-four hours it deposited much resin, from which the clear liquor was decanted and further evaporated to 500 c.c., and when cold treated with excess of caustic soda, then shaken well with three successive portions of chloroform. The separated and mixed chloroform was well shaken with dilute hydrochloric acid, which gave the ulexine in solution as a hydrochlorate; on evaporation it formed crystals. Whilst shaking the hydrochloric acid with the chloroform, a hitherto unobserved effect was produced; a peculiar milkiness developed itself in the chloroform, rendering it quite opaque. This peculiarity I attribute to the formation of minute particles of solid hydrochlorate of ulexine, which become mechanically attached to the chloroform; for on shaking with plenty of warm water, the chloroform is restored to its original state, and the water found to contain hydrochlorate of ulexine. To obtain free ulexine in a condition of purity, it is requisite to purify the hydrochlorate by several crystallizations from water, powdering, then washing the crystals with absolute alcohol; on re-solution in water, the pure base is extracted by soda and chloroform. If the separated chloroform be allowed to evaporate spontaneously, compact masses of long crystals are formed; but if evaporation be done rapidly, as over a water-bath, a granular powder is the result. An experiment was made to remove the ulexine from the liquor made alkaline with soda, by means of other solvents than chloroform. Neither ether, benzine, nor benzole proved of any use; amyllic alcohol was found a fair solvent, but not so good as chloroform.

The yield of ulexine by the new process was 191 per cent. calculated on the seed, showing an increase of 33 per cent. on my first working. The result is satisfactory so far as the use of the hydrochloric acid is concerned, showing it to be a valuable solvent where alkaloids have to be separated from fats. In using the word solvent, I do not wish to create the impression that the hydrochloric acid has merely a mechanical action; no doubt in the present case it displaces an organic acid, itself uniting with the ulexine. There is some evidence in favour of this view, as, after shaking the oily matter with the hydrochloric acid, the separated and washed oil slowly deposits an amorphous resin of distinctly acid character. To this acid body I provisionally give the name ulecic acid, reserving it for future investigation.

The bark and young tops of furze were both examined, and found to contain ulexine, but in much less quantity than the seed;

the very young herbaceous green tops, as eaten by cattle, gave a very small proportion of the base.

Searching for a reagent to distinguish ulexine from other alkaloïds, one was soon found in ferric chloride, with which the pure base and all its salts give a deep red colour. The proper method of applying the reaction, is to place a small solid particle of a ulexine salt on a white porcelain surface, adding a small drop of ferric chloride from a glass rod. There are other properties which particularize the base; it is soluble in its own weight of water, quite insoluble in pure ether, also slightly hygroscopic. Among the salts of ulexine, so far as they have been made, the finest crystals were yielded by the nitrate, hydrochloride, hydrobromide, sulphate, and platino-chloride. The nitrate crystallizes from water in large oblique prisms, some of which are more than a centimetre in length; it is soluble in ten parts water, almost insoluble in alcohol. The chloride also forms prisms, more soluble in water and alcohol than the nitrate. The platinochloride is made by mixing solutions of the two chlorides, when it falls as an abundant yellow precipitate, dissolving easily when gently warmed; the solution on cooling rapidly depositing groups of fine crystals. Several grams of this salt have already been made for analytical purposes; the ease with which it forms crystals is fortunate, as insuring its purity.

In view of galenical preparations of ulex seed being required though not fully prepared to give formulæ, a few remarks may be ventured under the head of its pharmacy. Water is not a good solvent for the seeds. Rectified spirit gives an extract of far too oily a nature and soft consistence to be practically useful. An alcoholic liquid extract is also open to objection: it would give very unsightly turbid mixtures on dilution with water; for the same reason a tincture is not to be recommended. It is my opinion that the best preparation is to be obtained by washing the alcoholic extract with dilute hydrochloric acid, as done in making the alkaloïd, then neutralizing the acid fluid with soda, finally evaporating till one weighed pound of the seed gave 12 fluid ounces of extract and making this to 16 fluid ounces with spirit. In such a preparation most of the useless insoluble matter, which in many cases goes to make our liquid extracts and tinctures incompatible, inelegant, and unnecessarily nasty, would be excluded, whilst the presence of the active principle would be fully insured.

A vote of thanks having been passed to Mr. Gerrard,—

Mr. NAYLOR said it seemed somewhat remarkable that while *U. Europæus* should have been so carefully examined chemically, with a view to ascertain its nutritive properties, and while a large percentage of nitrogen should have been found in the plant, no previous chemist should have thought it worth while to search for an alkaloidal substance. No doubt many present had had an opportunity of chewing a little of this *Ulex Europæus*, but he had never found that distinct bitterness which would have led him to expect the presence of an alkaloid, and it would interest him to know what had induced Mr. Gerrard to search for a substance of this kind. A certain process was recommended for the preparation of this alkaloid, and special stress was laid on the point that there would be left behind all the useless extractive resinous inert matter, but he should like to know whether Mr. Gerrard had sufficient evidence to warrant that assertion. Had it been in any way proved that the ulexine was the physiologically active principle of the *U. Europæus*?

Mr. HOLMES asked if the alkaloid was absolutely obtained from *U. Europæus*, or from the species of which Mr. Gerrard had placed a specimen on the table. Botanists considered the two species distinct; one, the *Ulex Europæus*, being in flower in April, and the *Ulex nanus* in August. Both species remained in flower for a considerable period, so that it was often stated that furze blossomed all the year round. It would be interesting if Mr. Gerrard would carry his investigation still further, and ascertain if both species contain the alkaloid. As the author of the paper had alluded to the pharmacy of the subject, he should be glad to know whether any experiments had been made by Dr. Ringer and others as to the action of this alkaloid. Many plants of the *Leguminosæ* had a powerful action, some possessing narcotic, and some diuretic properties.

Mr. BENDER said he had lately noticed amongst the Welsh mountains many acres covered with a blossom which he presumed was that of *U. nanus*.

Mr. ALCOCK asked whether the seeds were ripe when treated, or in what stage; secondly, had Mr. Gerrard conducted a process of combustion, and, if so, what was the formula arrived at; thirdly, as this was a leguminous plant, closely allied to broom, might the alkaloid not be related to sparteine? Mr. Gerrard had spoken of an oily liquid, and sparteine had that characteristic.

Mr. GERRARD, in reply, said the history of the investigation was briefly this. He was purchasing a few seeds for his garden, and seeing a large bag of furze seed, he took up some and chewed it,

and it struck him there was something peculiar in its taste. He found it produced a peculiar sensation in the mouth, and a slight sensation of numbness on the tongue. He, therefore, purchased sixpenny-worth of these furze seeds, took them home, and got sufficient alkaloid to warrant further experiment. With reference to what he had called inert matter, he did not suppose it was altogether inert, but the object of preparing a pharmaceutical preparation was to get into it the whole of the definite and active principles on which one could rely physiologically, and that was his aim in working out this process. With regard to its physiological action, he had only recently obtained the alkaloid, and he could only say at present that its action on frogs was to paralyse them. His examination had been confined to the seeds of the *U. Europæus*, and he believed they were ripe. He was told they were sold for distribution amongst landowners, for producing a kind of undercover for game and young trees. He had brought a specimen of *U. nanus*, as being of local interest. He had walked long distances lately, and searched closely for a flowering specimen of *U. Europæus*; singularly enough, on a hill near Ambleside he found a flowering specimen, high up in a sheltered position. He had not made any combustion, but he had simply prepared the crystalline salts for the purpose.

An abstract of the next paper was read by Mr. Unney. It was entitled—

NOTES ON THE CHEMICAL EXAMINATION OF THE FRUITS OF *DAPHNIDIUM CUBEBA*.

BY J. OLDHAM BRAITHWAITE AND E. H. FARR,
Pharmaceutical Chemists.

The occurrence some months ago of a considerable quantity of the fruits of *Daphnidium Cubeba* on the London drug market, apparently introduced under the idea that they were genuine cubebs, has enabled us to obtain sufficient for a preliminary chemical examination, and as no investigation of this nature appears to have been previously instituted, excepting a short note read at last year's Conference by Messrs. Elborne and Wilson, we have thought that possibly a few further notes thereon might prove of interest.

These fruits, kindly identified by Mr. E. M. Holmes, are not at first sight unlike the official drug, but inspection at once shows marked botanical distinctions. In form they are almost spherical

are of a dull reddish brown colour, and have a marked pleasant odour, with a bitter aromatic taste; they are superior, one-celled, berry-like fruits, easily detached from the persistent calyx and its accompanying short stalk. The pericarp is rugose, soft and oily; the testa very hard and shell-like. The embryo is very oily. A microscopic examination of a transverse section of the integuments of the fruit shows further differences from that of *Piper Cubeba*. In *Daphnidium* the testa (A) is composed of a layer of extremely hard, elongated cells, placed with their extremities towards the axis, and having an interrupted layer of sclerenchymatous cells (B) on the exterior, with a softer layer of tabular cells (C) next to the embryo. The pericarp (D) is very oily. In *Piper Cubeba* these elongated cells are not found, the testa being composed solely of hexagonal sclerenchymatous tissue.

A. Extraction by Petroleum Ether.

As a preliminary experiment 25 grams of the finely powdered drug was exhausted by maceration in a known volume of petroleum ether. A measured portion was evaporated, when it left a residue equivalent to 24.2 per cent. This residue consisted of a semi-solid unctuous mass of a deep sherry colour, having a peculiar aromatic odour and a bitter soapy taste. At 30° C. it melts into a deep amber fluid. Exposed in the melted state, it gradually loses weight to the extent of 1.25 per cent. Examined under a two-inch objective by polarized light, the mass is seen to be semi-crystalline, giving indications of the presence of radiating needles.

It being evident that both fixed and volatile oils were present, a further quantity of the original substance was treated for the extraction of each in sufficient quantity for examination.

Compared with the volatile oil of *Piper Cubeba*, the following distinctive colour reactions were obtained:—

Reagent employed.	Vol. Oil <i>Daphnidium</i> <i>Cubeba</i> .	Vol. Oil <i>Piper Cubeba</i> .
Sol. Br. in CHCl_3 (1 in 20). The same, the mixture afterwards diluted with Absolute Alcohol.	Yellow. Canary yellow solution.	Violet blue. Violet blue solution.
Hydrochloric Acid.	Yellow.	At first colourless, then violet.
Nitric Acid.	Yellow to dull brown.	Yellow to bright violet.
H_2SO_4 and CHCl_3 .	Rich umber brown.	Violet brown.
The same, with excess of water.	Dull red brown.	Bright violet.

1. *Volatile Oil*.—Thirty-one ounces of the finely powdered drug was submitted to a current of steam; the volatile oil carried over, floating on the top of the water in the receiver, was partly removed by means of a separator, the water being afterwards shaken with petroleum ether to recover the last traces. By this means 1 per cent. of volatile oil was obtained. It is of a pale yellow colour, having an agreeable characteristic odour between that of the oils of lemon and verbenä. Below the temperature of 15.5°C . it is solid; it melts at 17°C ., and has a specific gravity of 0.911 compared with water at that temperature. It is soluble in alcohol and in chloroform in all proportions, and is insoluble in bisulphide of carbon.

2. *Fixed Oil*.—In order to obtain a sufficiency of this body for examination, a larger quantity of the fruit was exhausted by percolation with petroleum ether, by which means about 30 per cent. of oil was obtained; containing, however, a large amount of resin in solution. It was found in subsequent experiments that when the fruits were exhausted by maceration only, the fatty bodies removed were much more free from resin than when percolation had been employed; the first portion of the percolate, almost saturated with oil, carries out with it a large amount of resin, which may be subsequently precipitated by dilution with the menstruum. On treating the semi-solid mass left after the evaporation of the petroleum ether with cold absolute alcohol, a white insoluble residue was obtained equal to 1.5 per cent. of the fixed oil. This was readily soluble in hot alcohol, from which it was deposited on cooling in groups of white radiating crystalline scales. After repeated crystallizations, several successive fractions had a melting point of 43.5°C . These physical characters rendered it probable that the body was lauric acid, a supposition which the determination of its saturating power, when titrated with standard alcoholic solution of potash, afterwards confirmed.

After the removal of this acid and the subsequent dissipation of the alcohol, the oil again became pasty and threw out a further crop of crystals, which, however, could not be removed by means of alcohol, owing to their solubility in a mixture of that solvent with oil. When the mixed oils were treated with H_2SO_4 , charring took place and SO_2 was evolved; with ether and a solution of sodic carbonate an emulsion was formed, CS_2 gave a cloudy solution, C_6H_6 a clear one unaffected by the addition of turpentine. The mixture was quite soluble in acetic ether, and gave a slightly cloudy solution with amylic alcohol.

The presence of resins accompanying the fatty acids rendered the process of their separation and subsequent purification somewhat tedious; after many experiments the following method was found to give satisfactory results. After shaking the mixed fats with acidulated water, they were saponified with NaOH in slight excess, the resulting soap was twice precipitated from solution by treatment with saturated solution of NaCl ; the partially purified soap was collected, dried, dissolved in boiling alcohol, and poured into cold mixture of ether and alcohol (five parts of ether to one of alcohol). After standing the precipitated soap was collected, washed with ether-alcohol, decomposed with HCl , the free fatty acids dissolved in alcohol and precipitated in successive fractions as magnesium salts by means of solution of magnesium acetate.

It was found that, owing to the relatively large volume of ether-alcohol solution necessary to remove all the resin, some fatty acid was also taken into solution. The ether-alcohol filtrates were therefore concentrated, and treated with powdered AgNO_3 , the resulting precipitate washed with ether-alcohol, decomposed with HCl , filtered and evaporated, when a liquid fat separated. This was converted into a magnesium salt, and is represented as the last fraction in the list below.

The respective magnesium fractions were decomposed and the melting points of the free fat acids determined as follows:—

	Melting Point.		
Fractions A.	43° to 45° C.	.	= Lauric Acid.
Fractions B.	28° to 30° C.	.	= Capric Acid.
Fractions C.	25°	.	= Capric and Oleic Acid.
Fractions D.	Freezes at 3° C.	.	= Oleic Acid.

Under each heading several successive fractions were examined.

The last of the series, when heated with PbO , formed a soap which was entirely soluble in ether, in turpentine, and petroleum. The other fractions were not obtained in sufficient quantity to permit of the determination of their saturating power by titration, but their physical characteristics are sufficient to identify them with the acids named. The lauric acid, as already mentioned, was obtained in greater quantity by separation from the alcoholic solution of the mixed fats.

The acid water with which the oil was shaken before saponification gave slight precipitates with alkaloidal reagents.

B. Extraction with Ether.

After exhaustion with petroleum ether, the powder was dried and extracted by maceration with ether. By this means about 11.5 per cent. of extract was obtained, consisting of a dark, red-brown mass, having an aromatic very bitter taste and a slight odour. Less than a decigramme gave rise to marked vomiting and purging on two separate occasions in different individuals. This effect was traced to the bitter acid resins subsequently separated. It is entirely soluble in absolute alcohol. When treated with water in the cold very little is dissolved, but the solution has a markedly acid reaction and a bitter taste.

A portion of the original extract treated with caustic soda and boiled with Fehling's solution gave a faint reduction; when previously heated for some hours with dilute H_2SO_4 a peculiar aromatic odour is evolved, and the solution darkens in colour on adding an excess of alkali, and gives a faint reduction with Fehling's solution.

Another portion was then treated with successive quantities of dilute H_2SO_4 . The straw-coloured solution thus obtained was shaken with CHCl_3 , which removed a trace of resin. The resulting acid solution was tested with alkaloidal reagents, with which it gave marked precipitates. The remainder of this solution was treated with excess of BaCO_3 , filtered, and $\text{Pb}_2\text{C}_2\text{H}_3\text{O}_2$ added to the filtrate; the precipitate was collected and the filtrate decomposed with H_2S , filtered and warmed until all gas was driven off; it still gave marked alkaloidal reactions, that with solution of iodine and potassium iodide being most delicate.

Having obtained these indications of the presence of alkaloid, an attempt was made to isolate it in larger quantity. 500 grams of the powdered fruit were percolated with petroleum ether, and the concentrated oily percolate shaken with successive portions of acidulated water. The oil-free marc was now exhausted by percolation with ether, and the concentrated ethereal percolate similarly treated with acid water; considerable difficulty having been previously found in treating the viscid ether residue with the solvent, it was thought preferable in this case to so agitate it before all the ether was evaporated. The acid solution came away nearly colourless, and it, together with that from the oil, was treated with excess of ammonia and shaken with CHCl_3 ; the residue after evaporation was dissolved in water acidulated with $\text{H}_2\text{C}_2\text{H}_3\text{O}_2$; $\text{Pb}_2\text{C}_2\text{H}_3\text{O}_2$ was added in slight excess to this solution, and the copious lead precipitate collected and washed.

The filtrate was decomposed by H_2S , warmed, and a slight excess of AmHO added, shaken with CHCl_3 , the resulting solution washed with water until free from the last trace of colouring matter, and then allowed to evaporate spontaneously under a bell jar. The residue consisted of a colourless varnish-like body, showing no signs of crystallization, even when dissolved in ether, in which it was sparingly soluble, and the ethereal solution allowed to evaporate slowly. It is sparingly soluble in water, the solution having a very faint alkaline reaction and a very bitter taste. Neutralized with hydrochloric acid it readily gives crystals on evaporation in the form of branching arborescent needles. The acetate also readily crystallizes in needles of a very similar character. In acid solutions it gives distinct, well-formed crystals, with platinic and with auric chlorides.

With the following alkaloidal reagents the subjoined results were obtained with the hydrochlorate:—

Solution of iodine and potass. iodide	Reddish brown precipitate.
Solution of KI	White precipitate.
Solution of ammon. phosphomolybdate.	White precipitate (permanent).
Alkaline solution potassio-mercuric iodide	Yellowish white precipitate.
Mercuric chloride	White precipitate.

When treated for colour reactions, as far as the amount of material at command would allow, the following chiefly negative results were obtained:—

With strong H_2SO_4 .	A yellowish solution.
“ “ HN O_3 .	A colourless solution.
“ “ HCl . .	“ “
“ “ $\text{H}_2\text{SO}_4 + \left. \begin{matrix} \text{K}_2\text{Cr}_2\text{O}_7 \\ \text{H}_2\text{SO}_4 + \end{matrix} \right\}$	No marked colour reaction.
“ “ $\left. \begin{matrix} \text{H}_2\text{SO}_4 + \\ \text{Sugar} \end{matrix} \right\}$	
“ “ Fe_2Cl_6 .	“ “

The precipitate thrown down by lead acetate solution was next examined. It was decomposed by H_2S , filtered, and gas having been driven off by heat, the solution was treated with ammonia, when it gave a copious white precipitate consisting of minute crystalline plates. This precipitate was collected and dried over sulphuric acid, when it formed a greyish white, odourless, tasteless powder, practically insoluble in water, but extremely soluble

in faintly acid solutions, upon which it exercises feeble neutralizing powers, and from which it readily gives well-formed crystals on evaporation. In these crystals, after washing with ether, the respective acids are readily detected by suitable reagents. The hydrochlorate especially crystallizes with great ease in well-formed prisms, which decompose the ray of polarized light. With alkaloidal reagents, however, it fails to give precipitates, nor have we succeeded in obtaining crystals with platinic or auric chloride. Picric acid, however, gives well-formed crystals. A portion of this body fused with metallic sodium gave abundant evidence of the presence of nitrogen, both by the prussian blue and the ferric sulphocyanate tests.

It gives negative results with all the colour reagents applied.

In applying the above tests, we regret to state that our supply of both these bodies was exhausted. The quantity present in the original fruit is so small (under 0.1 per cent.), and from the fact that they are accompanied by so large an excess of resinoid bodies, difficult to obtain in a state of purity, that, to obtain a sufficiency of either to submit to ultimate analysis, a far larger quantity of material than that at our disposal would be necessary.

After the removal of the alkaloidal portion, attention was directed to the resinous extract. From this, however, results of but little interest were obtained. It was evidently composed of mixed hard and soft resins, some of an acid nature, others faintly glucosidal. These we have partially separated by means of various solvents. None of them give any signs of crystallizing when neutralized separately with alcoholic potash, and after saponifying and decomposing with acid, they are reprecipitated as resinous masses, the soft acid resins forming a rather permanent emulsion with water.

Ether soluble resins, 11.5 per cent.	{	Soluble in C_6H_6 = 4.91 per cent. Soluble in Am HO. A soft extract, and very bitter acid, causes sickness and purging when taken in small quantities. CS_2 splits it up into two parts.	{	Soluble in CS_2 . A soft sticky red-brown mass markedly acid, very bitter = 2.86.
		Insoluble in C_6H_6 . Soft pilular consistence, dark red-brown colour, insoluble in Am HO = 6.59.		Insoluble in CS_2 . Pilular consistence, red-brown, slightly acid = 2.05.

The above char with nitric acid and with sulphuric acid much

more readily than the two resins subsequently extracted from the alcohol extract, and when so treated form oily drops, whereas the alcohol resins char, leaving a skeleton-like network of charred matter.

C. Alcohol Extract.

After treatment with ether, and allowing that solvent to dissipate, the marc was exhausted with alcohol, which yielded after evaporation 3.5 per cent. of residue. This consisted of a red-brown resinous extract with a bitter taste. The acid aqueous solution gave only a faint trace of alkaloidal reaction when free from resin, almost all the alkaloid having been removed by the acid resin in the ether extract; rendered alkaline, however, it copiously reduced Fehling's solution. At first water removes but little of this reducing body, but upon standing the solution becomes of a sherry yellow colour and very bitter; the amount of reduction is not apparently increased after prolonged boiling with acid. This reducing body is not removed from acid solutions by petroleum ether or by chloroform. In alkaline solution traces are removed by chloroform, but the relative volume of the fluids and the proportion of acid or alkali present seems greatly to influence the solubility, which is somewhat evenly balanced. The simple aqueous solution of the alcohol extract, however, when treated with chloroform gave up a portion of soft bitter resin which gave a copious reduction with Fehling's solution. This would appear to be the source of the glucosidal reactions obtained.

After the removal of this body by treatment with water, it was found that chloroform resolved the alcohol extract into two portions,—one soluble, the other insoluble in that menstruum. Of these, the former was acid, the latter neutral in reaction. Both were of pilular consistence, red-brown in colour, and bitter in taste; both are soluble in ammonia.

D. Aqueous Extract.

The residue exhausted by alcohol was dried and macerated with a known volume of water, by which means 5.8 per cent. of extract was obtained.

A further portion of the aqueous extract treated with absolute alcohol, and the resulting precipitate weighed and dried, it was found to be equivalent to 1.6 per cent. This precipitate was soluble in water.

The alcoholic solution gave no precipitate after boiling. Sugar

was not found to be present in any form. Starch was present in the fruit in very small quantity.

From the above results we conclude that the following may be taken as a preliminary statement of the constituents of the fruit:—

Petroleum ether extract, 24·2 per cent.	{	Comprising volatile oil, 1·25 per cent. Non-volatile fats consisting chiefly of laurie, capric, and oleic acids.	{	23·95
Ether extract, 11·5 per cent.	{	Comprising three resins separable by solvents. Two alkaloidal bodies, one precipitated by lead acetate, the other not. Traces of glucosidal resin.		
Alcohol extract, 3·5 per cent.	{	Comprising faint traces of alkaloid. A glucosidal resin. Two neutral resins.		
Aqueous extract, 5·8 per cent.	{	Consisting chiefly of extractive with some mucilage, contains no alkaloid or glucosidal matter. Free from sugar.		

The moisture was estimated to be equal to 5·34 per cent. Upon incineration the fruits left 5·998 per cent. of ash.

A vote of thanks having been passed to the authors,—

Mr. NAYLOR asked if the authors could give any specific test for distinguishing between the false cubebs and the true in mixtures of the two as they occurred in commerce. He had often applied the test of iodine to the decoction, but did not think it at all satisfactory. He gathered that it could be recognised by distillation, but if there were any specific test easily applied, he should be glad to hear it.

Mr. MACEWAN said the fact that this new chemical contained an alkaloid, while the true cubebs did not, would be a good test.

Mr. JONES remarked that attention had also been drawn to the microscopical character of the plant.

Dr. SYMES said he was pleased to hear from Mr. Umney that these cubebs were imported under the impression that they were genuine. Drugs were frequently sent from abroad in the place of similar drugs, not with the view of substitution, but frequently because there was some resemblance, and they were supposed to possess similar medicinal properties. He remembered a case in which a quantity of pao-pereiro was sent over under the impres-

sion that it was cinchona bark, containing a large quantity of quinine. When a drug came over which had some resemblance to another, the term false or spurious was immediately applied to stigmatize it, sometimes unjustly, and he feared that rather tended to prevent enterprise in the way of importing unrecognised substances.

Mr. Moss asked if Mr. Naylor meant that a mixture of cubebs with this daphnidium occurred in commerce. He had never met with such, although he had met with a mixture of the ordinary cubebs with *Piper crassipes*, which could be distinguished by the flat pedicel and the piney odour when crushed. These could be picked out without much difficulty if you were well acquainted with the general appearance.

Mr. ALCOCK said Dr. Shillitoe drew attention to the dangerous character of this admixture, and he presumed Mr. Naylor wanted to know how to detect the mixture when in powder. He should like to know if the authors had noticed the specific gravity of the oil.

Mr. GROVES said he had recently noticed the statement that a parcel of cubeb stalks had come over, but as no one appeared to be wanting cubebs for grinding, the stalks were withdrawn. He should like to know if there was any justification for this insinuation; and if not, what the stalks were used for?

Mr. HOLMES said there was at the present time a third false cubeb in the market, which had come in large quantities, and which differed in size from either of these, being larger, and having a stalk twice as long as the ordinary cubebs. With regard to distinguishing powdered cubebs—to which Mr. Naylor no doubt alluded—from a mixture with daphnidium, it would hardly be possible to do so, except in the way Mr. MacEwan had pointed out. He had endeavoured to distinguish it chemically, but found the daphnidium gave negative tests only.

Mr. ELBORNE thought the daphnidium fruit was so unlike cubebs that no powdered cubebs in commerce could possibly be adulterated with it, simply because the fruit was of such an oily nature that it would altogether destroy the character of any powder with which it was mixed. The ordinary adulterant was the fruit of the *Piper crassipes*. This root was altogether so unlike cubebs that a critical examination would be quite sufficient to distinguish it.

The PRESIDENT said the point mentioned by Mr. Naylor was very important, a mixed oil was in fact coming into the market. It was

much more difficult now to bring adulterated articles into the market than formerly. Many of these things were sent from abroad, with a view to ascertain whether there was a market for them in this country, not necessarily as adulterants or substitutes. What was done with them afterwards he did not know.

Mr. UMNEY said he would reply as far as he could to the points which had been raised. He could quite corroborate what Mr. Moss said, that there was no difficulty in picking out from true cubebs the *Piper crassipes*. In order to do so readily, it was necessary to crush the fruits, and in his rounds, inspecting drugs, he invariably took a coin from his pocket, put the cubebs under the coin, and then crushed them with his heel. There was then no difficulty in detecting the presence of *Piper crassipes*, because there was a very camphoraceous odour from the powder so produced. As to this drug, no one who had really examined it could mistake it for true cubebs. It perhaps could hardly be said that these drugs came in from absolute ignorance, because unfortunately they generally came in when the drug which they resembled was very dear. He had known cubebs at 25s. per cwt., and he had known them at £20, and it was generally when abnormally high that spurious drugs came in. With reference to the stalks which Mr. Groves had referred to, there was a large parcel offered recently for sale. By the side of those stalks were the cubebs from which they were sifted. Most people who knew how drugs were disposed of in London were aware that these stalks were simply put into the still to be worked for essential oil. Chemically there was little difference between the essential oil of the cubebs stalk and that of the fruit; not so much in fact as between the essential oil of cloves and of clove stalks. The essential oil of clove stalks was drawn to a very large extent in England and on the Continent. He had never known a mixture of daphnidium with cubebs.

The last paper read at this sitting was:—

NOTES ON TRADE SAMPLES OF CITRATE OF IRON AND QUININE.

By F. H. ALCOCK.

The subject I have ventured to bring before you is one which is not new to the Conference, for in several forms it has appeared on three or more occasions at these meetings. Of former papers

there are those of Schweitzer, Braithwaite, Fletcher, and De Vrij; but the points which they discussed had reference chiefly to the amount and nature of the alkaloidal constituent.

During an inquiry into the cause of the variation of different samples of citrate of iron and quinine, with regard to solubility and other characters, I was led to examine specimens of the official kind which were to be found in commerce. The results of my examination of these were thought of interest and are embodied in the following notes.

Source.—The samples were procured from well-known manufacturers, and by label and otherwise were considered to be typical representatives of the B.P. (1885) kind.

Appearance.—The appearance of all was very much alike, but the scales were not by any means what would be called "fine." It was also noticed that some samples changed colour much more rapidly by sunlight than others, and became of a dark brown colour.

Solubility.—This was ascertained by preparing a solution containing 1 drachm of substance in 4 fluid drachms of distilled water. It will be seen from the table that two formed clear solutions and four were not so satisfactory.

Ferric Oxide.—Under this head is included the ash obtained by igniting in the ordinary way a definite quantity of material and weighing the residue. The amount obtained, it will be seen, does not vary very greatly, the lowest being F, which is 16.4 per cent. the highest being D, which is 21.1 per cent. On adding water to the residue, and testing the clear liquor with litmus paper, it was found that F, was strongly alkaline, while the others were but feebly so, if at all. The ferric hydrate is sometimes obtained by using sodium hydrate in place of the B.P. precipitant; but if such is the case, most of the alkali is removed during the washing process, as there was little or no evidence of the presence of soda in the ash. The alkalinity of F, I am inclined to think, was due to potash, this being sometimes used to assist in the partial reduction of the ferric salt, in order to impart a tinge of green to the golden yellow scales as required by the B.P.

Alkaloidal Constituent.—As the nature of the alkaloid present in my samples was not to me at the time of the first importance, I contented myself with simply estimating its amount according to the B.P. process, using chloroform as the solvent, allowing the greater portion of the chloroform to evaporate spontaneously in a current of air, and then drying the solid residue to practical constancy at 212° F.

The "deficiency of alkaloid" in this preparation has been called by a prominent member of the Conference a threadbare subject, so that I hardly dare to say much on this point. The amount of alkaloid still seems to be variable, but not to a very great extent when compared with results previously published; but it is evident, presuming that the B.P. process abstracts all the alkaloid and sufficient manipulative care has been used, that there is still an imperfect understanding amongst manufacturers as to the percentage of alkaloid required by the B.P., even after the lively correspondence which has delighted the readers of our journals, and the official dictum of Professor Attfeld. I may be allowed to say that I think it is desirable that tests should be adopted in the Pharmacopœia to ascertain the nature of the alkaloid, and also that we should be informed as to how and at what temperature we must dry the alkaloidal residue.

The figures obtained show an average of 14.2 per cent. of alkaloid, and we may ask, would not a standard of 14 per cent. be much more convenient to adopt and more practicable to obtain, than 16 per cent., or even the 15 per cent. as more recently authorized?

Abnormal Constituent.—Perhaps this is to me the most interesting portion of the paper. Under this name I include the presence of sulphate; for although the literature concerning this remedial agent is somewhat voluminous, yet I have not been able to find the amount, or even the presence, of sulphate alluded to. In all samples, as may be expected, sulphate was found, but in variable quantities. As the B.P. tests are silent on this part of the subject, we may conclude that the manufacturer has consent "by authority" to leave a little in the finished product; but that there should be such wide differences in amount is not so intelligible, especially when its presence in more than traces does not indicate careful manipulation during the process of manufacture. There are many ways by which sulphate finds admittance into the preparation, but it is unnecessary for me to relate them. One question, however, suggests itself to me, viz., could the sulphate of quinine be used without first converting it into the alkaloid, and thus avoiding a loss of quinine which is inevitable in the official process? It will be seen in four instances that the amount of SO_3 is somewhat high, and not far off the amount contained in the quinine sulphate used, if we suppose that the "mud" has been previously well washed. On the latter point one manufacturer is reported to have said that the B.P. authorities have retained the same vain attempt to get

rid of every trace of sulphate from the ferric hydrate, but my results will show that if we cannot obtain absolute freedom from this impurity, yet we may arrive very near to that desirable state. The sample marked C contained but a mere trace of sulphate, and as this was the best in every respect, I am of opinion that an article as free as possible from this radical is most likely to give the best results and the greatest satisfaction, *ceteris paribus*, to those who have to use citrate of iron and quinine.

Conclusion.—Since writing the above, I find that Professor Prescott, of the United States, examined some samples of citrate of iron and quinine made according to the U.S.P. formula of 1870, and in them he found sulphate to the extent of less than 1 per cent. in three samples, and in three others 6·5 per cent., 3·5, and 1·3 per cent. respectively of that radical.

Tabulated Results.

Sample	Solubility.	Ferric Oxide.	Alkaloid.	Sulphate. SO ₃ .
A	Clear	18·2	14·7	0·875
B	Turbid and flocculent	20·0	14·0	1·812
C	Very clear	19·8	15·3	0·141
D	Clear, but turbid on standing.	21·0	13·0	2·386
E	Ditto	19·0	14·6	2·467
F	Very turbid	16·4	14·0	1·704

The PRESIDENT having moved a vote of thanks to Mr. Alcock,—
Mr. UMNEY said he had had some experience in this preparation. Ten or twelve years since he pointed out that the last edition of the Pharmacopœia was in error in stating that the result after precipitation of the citrate of iron and quinine by ammonia was to give 16 per cent. of anhydrous quinia. No experiment was necessary to show such was a mistake. Unquestionably it was worked out on paper and not in the laboratory, for it was presumed that if they started with 100 parts of quinine the product would be exactly 400 parts; and so it went on for years, but manufacturers well knew that 100 parts of quinine in the laboratory produced about 460 of scaled citrate, and therefore it was impossible that the final product should contain 16 per cent. of anhydrous quinia. This statement was left unaltered in the new edition. He challenged the accuracy of the statement, and those who remembered the position some of the authors took up on the question,

would also remember the result which followed, that the percentage was brought from 16 to 15. Having said thus much, he was bound to stand up for the compilers of the Pharmacopœia, and to say that any citrate of iron and quinine that did not yield 15 per cent. quinia had not been properly prepared. Of that he had no doubt whatever, and that the specimens here mentioned as containing only 13 per cent., and so on, of alkaloid, were not properly made, and unless it arose from some accident such a practice was a disgrace to pharmacy. As the Medical Council had conceded the 15 per cent., pharmacists should be more than ever particular in insisting that the preparation should come up to what they themselves said it should be. Mr. Alcock asked if sulphate of quinine could be put in just as it was. He should say yes, repeating his statement of last October in Bloomsbury Square. If the sulphate of quinine was put into ferric hydrate dissolved in citric acid, the resulting preparation was fairly satisfactory; but such was not elegant pharmacy. It was quite impossible to take sulphate of quinine, and to precipitate its quinia on a large scale, without losing some portion of the quinia. He was sufficiently charitable to suppose that the alkaloid had been lost in some cases by carelessness, and that it did not result from downright fraud. With regard to turbidity, that to a great extent was due to improper precipitation of the ferric hydrate. Ferric hydrate precipitated on a large scale was not precipitated with caustic ammonia, but with caustic soda. It was put into large vats, ferric sulphate run in, stirring going on the whole time, and unless precipitation was carried on very slowly, and the alkali in excess, the precipitate would contain more or less of oxy-sulphate of iron, and the presence of this body in the final product would give a solution more or less turbid. Again, with regard to the addition of ammonia, operators were often liable to regard a strong solution of ammonia as a very definite body. Sometimes they employed it of a specific gravity of '880, but that of the present Pharmacopœia was '891, and in trade ammonia existed of very much greater strength than this, or even '880. If they were working during cold nights, liquid ammonia was produced of much greater strength, and if an excess of ammonia by measure without estimation of its strength were put in, the citrate of iron and quinine finally produced would not make an elegant solution. The subject need not be regarded in any way as threadbare, for the time had come when it ought to be looked at anew, since there was a new Pharmacopœia in which a mistake was originally made, and the

authorities had now recognised that mistake. They now named a minimum of 15 per cent., and all should be on their guard. He for one should say that any pharmacist who sold citrate of iron and quinine which contained as little as 13 per cent. quinia, ought to be punished, unless he could show some good cause for the deficiency.

Mr. CONROY said Mr. Alcock had done excellent service in bringing this important matter before the meeting. He had tested many samples of citrate of iron and quinine, and was surprised at the number that fell below the percentage of quinine given in the Pharmacopœia. The lowest figure he got was 12·8 out of fourteen samples, nine of them were below 14, and the others averaged a little over 15 per cent. He himself had made many experiments to see what the actual result would be, but he must say that he had never by following the Pharmacopœia process of manufacture obtained a sample which fell below 15 per cent., and he agreed with Mr. Umney that that percentage should be insisted upon. It was well known that samples which tested 13 per cent. or below 14 per cent. of quinine were those sold by manufacturers at a lower figure than that obtained for the 15 per cent. article. He always found more sulphuric acid in samples that were deficient in quinine, and this, to his mind, pointed to the fact that manufacturers who did not use the full percentage of quinine were also in the habit of adding it to the iron salt as sulphate. By that means such a manufacturer would be at a great advantage as against one who followed the Pharmacopœia process.

Mr. LASCELLES-SCOTT asked whether Mr. Alcock ever found cinchonine in material quantity replacing—not chemically, but commercially—quinine. In the present year he had two samples given to him of German manufacture, in which the whole of one sample was replaced by cinchonine, and in the other about two-thirds of it, the total alkaloid in both instances not amounting to more than 13 per cent. He could quite confirm the last speaker, that if made according to the Pharmacopœia process, 15·3 or 15·4 was about the lowest percentage of quinine it should have. Out of twenty-two samples examined last year, five were sufficiently near the standard, and the rest varied from only 4 per cent. to about 13.

Mr. H. W. JONES said from some little experience in this matter, he could quite bear out what Mr. Umney and Mr. Conroy had stated. There was no difficulty in obtaining a product which should contain 15 per cent. He was rather struck with the fact

that out of six samples purchased from different sources, only one reached the standard; and he should like to know if Mr. Alcock drew the inference that the citrate of iron and quinine as supplied by wholesale houses generally to retail druggists fell below the mark? He was well acquainted with samples supplied by three manufacturers well known in the trade, and he never in any instance found them to fall below 15 per cent.

Mr. ALCOCK said he was pleased to hear that the majority of speakers confirmed him, that the samples were not up to standard. If Mr. Jones would tell him the source from which he obtained the three samples he referred to, he should be very pleased to examine them, so as to make his list complete. With regard to Mr. Scott's remark, he might say that he had carefully avoided the examination of the alkaloidal residue. With regard to Mr. Jones's question, he did not draw any inference—he simply stated the facts.

The Conference then adjourned.

Wednesday, September 1, 1886.

The PRESIDENT took the chair at ten o'clock. The first paper read was—

THE CORRELATION OF STUDY IN BOTANY AND MATERIA MEDICA.

By W. HILLHOUSE, M.A., F.L.S.

Standing, as the pharmacists of this country hope and believe they do, not far from the brink of a great change, which will not merely alter the conditions of pharmaceutical study, but will greatly affect, and for the better, the status of the pharmacist, those responsible for pharmaceutical teaching have no doubt brought their matured experience collectively to bear upon the question of how best to plan out the future pharmacist's student career. Far be it from my thoughts to venture to teach to them what they are infinitely more competent to teach to such as I am. The fact of an outsider approaching at all such a subject as this may savour not a little of impertinence; but on the other hand, it had been often recognised that nothing is lost by a subject being approached from many sides, and that the wider the angle from which two incident views are taken of any subject the more likely is it that the consideration will be comprehensive.

Perhaps it may still further help to disarm, not criticism, but hostility, if there be any, if I lay the responsibility for the germ of these thoughts upon the shoulders of a past President of this Conference, but a few short months ago borne to his last rest. Some two years ago the late Mr. W. Southall was, so far as his enfeebled health would admit, an earnest worker in the Botanical Laboratory close by the room in which we are now assembled. While our intercourse opened up a wide field of investigation for him, it equally opened up a new field of thought for me,—thought which has practically germinated into this contribution to your Conference.

I take it that the main object of that curriculum at which you are aiming is *thoroughness*. Only by the way of the thorough student can one expect to become a thorough pharmacist. But life is short, a student's years, that is his years of systematic and trained study, are quickly told, while the realm of knowledge is ever broadening, the horizon in which ignorance and mystery dimly blend is being ever pushed further and further back. How, then, this great principle of thoroughness can be recognised, without unduly sacrificing the student's years, is a question deserving of the most anxious thought and keenest scrutiny.

I cannot help thinking that the changing times have not been sufficiently recognised by teachers of science. Time was, and not so very remotely either, when the sciences were thought of and spoken of as so many distinct and differing studies. But as research has at the same time broadened and deepened our knowledge, the interdependence of all branches of scientific investigation has become increasingly manifest. Twenty years ago the botanical teacher was tolerably happy with his magnifying glass, and perhaps a microscope; to-day he ought to be not merely microscopist, but chemist and physicist as well. The physicist tries still to occupy an independent position, but I cannot help believing that many of the phenomena of light, for example, would be far more firmly fixed in the student's appreciation as solid realities by seeing the effect of light rays on the vegetable organism, than by the most complex physical apparatus. To use a common but understandable phrase, the teachers of science have largely failed to "play into each others' hands," with the result that the students have largely failed also to grasp the fundamental truths of the correlation of sciences.

One cannot have been engaged in teaching botany for a decade of years without realizing what an admirable ground it is for

experimenting upon these general principles, and finding out to what extent they are solidly founded. Not only is it by far the best known direction in which to become initiated into the difficulties of microscopical manipulation, but it gives also a broad field for chemical and physical experiment. In recent years methods of teaching have become increasingly more and more biological and experimental. Facts are no longer laid down empirically, but reasons are studied alongside of them. Structure is now studied side by side with function, the two mutually explaining each other,—and this both with external morphology and internal anatomy.

It is manifest that the plant has two great fundamental groups of functions: the one vegetative, tending to support the life and enable the growth of the individual; the other reproductive, for maintaining the continuity of species. Of these the former is the earlier, involving the absorption and assimilation of food materials, probably food storage, secretions and excretions. In each of these functions the plant is dependent upon external conditions, quantitative and qualitative—light, heat, gravity, moisture, and each of these conditions is capable of isolation and separate experimentalization, both as to quality and quantity. But, given the conditions, the results depend upon the nature of the plant itself, upon its structure and inherited tendencies. You may supply the motive power and the raw material, but the work done, the waste, and so on, will depend on the nature and quality of the machine, and the perfection of its structure.

Teaching must therefore be—1, experimental; 2, microscopical.

It is not possible to understand how the plant machine does its work without studying the structure of its chief working parts, especially, that is, the leaves, and secondarily the roots and stems. And, just as in the engine there is a certain construction which is essentially mechanical, a framework, that is, the purpose of which is to keep the actual working parts in their proper positions, in similar wise it becomes necessary to study in its general principles the mechanical structure of the plant.

But when this is done there still remains the question of the continuity of species, and this involves a study of spore, flower, fruit, and seed, in addition to the general vegetative structure. Cases there are in which vegetative and reproductive life exist apparently simultaneously, and the student, beginning with these, might be led up step by step to the cases of flowering plants as generally studied, in which it is manifest that the two kinds of

reproduction existing in them are separated either by time or by space, and it would perhaps hardly need a backward review to suggest to the student that such separation was, in time at least, probably universal.

Although I have thus far, and most cursorily, confined myself to the teaching of botany from the point of view of its scientific study and its value in scientific training, I shall, I hope, show you before long that this is not alone in my thoughts. To the pharmaceutical student botany is largely a means to an end, and that end the study, systematically and intelligently, of some portion of the heterogeneous subject known as *materia medica*; and the real aim of this discussion is to see how by his botanical studies the student can be best armed for the attack, scientifically, and not in desultory wise, of this (may I call it?) Giant Despair.

I am not in a position to say to what extent *materia medicists* are satisfied with the present method of teaching that subject. The collective wisdom of the conjoint colleges of physicians and surgeons has ordained that a branch of knowledge which most ordinary beings would consider to be dependent on prior chemical and botanical training shall henceforth, while retaining its chemical, be deprived of its botanical basis. But, according to the same collective wisdom, therapeutics—the physiological action of drugs as the basis of medicine—can be and has to be satisfactorily taught during the first year of the student's career! A body of men capable of such an intellectual monstrosity would be capable of anything—even, like the wise ones of Gotham, of cutting off the limb of a tree between themselves and the trunk.

Taking the knowledge of drugs collectively, the following appears to be a strict classification of what is required for a scientific knowledge of them and their action, such as ought to be at the command of one who has intelligently to handle them. In this classification again I deal only with the vegetable side of the question, but the parallelism of the other groups is readily manifest:—

(1) Characters and means of recognition of the crude drug, including,

(a) External appearance, feel, [taste], smell, weight, etc.

(b) Microscopical characters and tests.

(c) General adulterants and mode of detection.

(2) To know whence and how the drug is obtained.

(3) The general properties of the crude drug, and the source of its special properties, *i.e.* its active principle, treated generally.

(4) To know the method of development of the drug itself, so far as practicable; and the nature, anatomical and developmental, of the structures whence it is obtained.

(5) The preparations in which the drug forms a part, the processes of preparation and their *rationale*; methods of manipulation, etc.

(6) The doses of the drug and of its preparations.

(7) The physiological action of the drug and its preparations.

Now the most cursory glance at such a scheme of classification will tend to show that there is work here, not for one individual of universal attainment, but for at any rate four specialists. Including chemistry, but excluding zoology, the groups (1) to (4), as above, giving the groundwork for the residue, appeal especially to the chemist (proper) and the botanist; groups (4) and (5), including posology, appertain to the pharmacist; group (6), the old therapeutics, belongs to the physiologist. If it be a rational principle in education to give to each teacher that portion of teaching for which he is best qualified, the old, especially medical, conception of how to teach "*materia medica*" should be rooted out, and if the title itself were lost science would be not much the worse. Pharmacognosy could well replace it, with pharmacogenesis as a handmaiden, and pharmacy, posology and therapeutics retaining their present position.

For our future considerations we will naturally confine our attention to pharmacognosy and pharmacogenesis.

In the theoretical scheme as laid down above I shall probably be asked if I recognise the continued existence of two stages of students in botany and pharmacognosy respectively. It appears to be both natural and essential that such should exist, for the encouragement of specialism and intellectual conflict, if for no other reason. But will you pardon my saying that I do not recognise the right or propriety of suppressing *principles* in the earlier stage. I would make the earlier teaching broad, even—and it may shock the prejudices of some of this audience—at the expense of its being somewhat shallower. The deepening of the teaching, accompanied, as it of necessity is, by still further broadening, I would leave for the higher grade. To use the power of thought and reasoning, this is a prime factor in true education, and I would rather have a man who thinks wrongly, than one who does not think at all. There is hope for the one, none for the other. Once get principles and reasons well grounded, and facts marshal themselves. Facts without reasons are like a fleet of vessels without crews, capable

of no concerted and intelligent action, but nevertheless readily capable of mutual destruction.

Thus I would attempt something as follows for the student of the earlier grade :—

1. Microscopic characters of all important drugs.
2. Microscopic characters of the most important drugs.
3. General recognition of adulterants, not specialized.
4. Plants and countries from which the most important drugs are obtained, with a practical knowledge where practicable, and the natural history of some of the most important plants.
5. Mode of origin of a few typical drugs, as castor oil, an ethereal oil, a resin, opium, etc.

Similarly, for other branches of the subject, taking the mode of extraction of typical drugs, so as to cover all the general methods, and so on.

The second grade I would suggest should be an amplification, and accompanying deepening of the first, with closer specialization and more detail.

If now we bring into schedule form the subject of botany, it will render clearer our purpose.

In the first or earlier stage I would include,—

- (1) The natural history and biology of plants.
- (2) Structure of the most important parts, especially—
 - (a) Leaves, their anatomy and development.
 - (b) Floral organs and fruits, including the seeds, and micro-chemistry of the reserve food materials, and the chief cell-contents.
 - (c) Roots and stems.
 - (d) Bark, glands, and other secretory organs.
- (3) Systematic botany, including—
 - (a) Principles and objects of classification, and application of biology as above.
 - (b) Chief natural orders, especially those of economic or biological interest and importance, and the most important or illustrative plants they contain.

The second stage would be an amplification of this.

Every practical botanist will now at once recognise that it is quite possible to teach the subject of botany, especially in its anatomical and practical side, in such a way, and with such illustrations, as shall very materially help the student in his future work, without in any way militating against the thoroughness of his botanical training proper. It will, however, place the matter

more clearly if I venture to add one more schedule, giving a list of plants, or of parts of plants, just as fully suited for microscopical study as those at present used, and yet which, as you will see, are entirely taken from the pages of a current "Materia Medica."

Roots.—*Aconitum Napellus*.

Glycyrrhiza glabra.

Taraxacum Dens-Leonis (also latex vessels).

Rhizome.—*Podophyllum peltatum*.

Corm.—*Colchicum officinale*.

Stem.—Twigs of *Solanum Dulcamara*.

Shoots of *Rosmarinus officinalis*.

Bark of *Daphne Laureola* or *D. Mezereon*.

„ *Salix Caprea*.

„ *Ulmus Campestris* (stem also).

„ *Quercus pedunculata* (including tannin).

„ Flowering tops (♀) of *Cannabis sativa*.

Stem of *Pinus Pinaster* (including resin passages).

Saccharum officinarum (including wax).

Leaves.—*Thea sinensis* (including isolated branched idioblasts).

Ruta graveolens (including lysigenous oil-glands).

Prunus Lauro-cerasus.

Eucalyptus globulus (oil-glands and wax).

Rosmarinus officinalis.

Aloe barbadensis or *A. Socotrina*.

Inflorescence.—Catkins of *Humulus lupulus*.

Fruit of *Ficus carica*.

Petals.—*Papaver rhœas*.

Stigma and Style.—*Crocus sativus*.

Fruit.—Capsules of *Papaver somniferum* (also latex system).

Citrus Aurantium (or *C. communis*, if possible).

Rosa canina.

Amygdalus communis.

Carum Carui (including, also, resin glands).

Triticum vulgare.

Seeds (often including fruits).—*Sinapis nigra* or *S. alba*.

Linum usitatissimum.

Strychnos nux vomica.

Ricinus communis.

Areca catechu.

Gall.—Oak.

Entire plant of *Helleborus foetidus*, including rootlets, leaves (morphology, including bract transition), flower.

development of pollen, ovary, development of ovules, etc.

Filices.—*Aspidium filix mas* (for anatomy, young plants).

Lichenes.—*Cetraria islandica*.

Fungi.—*Sclerotium* of *Claviceps purpurea*.

This list at least furnishes a skeleton which other, and more experienced, teachers could clothe with flesh and blood, and thus provide a basis for that common understanding between teachers and taught which would lead to the great desideratum which I hypothecated in commencing, viz., compactness combined with thoroughness.

I have, as you will have observed, only incidentally touched upon the recent exclusion from medical training of that branch of knowledge to which it is little or no exaggeration to say the practice of medicine owes its very existence. It is difficult to approach a matter in which one has pecuniary interests, however trivial those interests may comparatively be, without laying one's self open to the accusation of allowing interest to bias opinion,—an answer coming always very readily from those who have none other to give. But underlying this matter there is a grave principle at stake. Is it, or is it not, true that from the vegetable kingdom the physician draws, and will probably continue to draw, his most potent drugs, his most certain remedies, his only specifics? Is it, or is it not, true that the most valuable amplifications of medical knowledge, in the way of new modes of treatment, and of the ability to grapple with hitherto omnipotent forms of disease, have been, and increasingly are, most closely associated with a knowledge, a practical knowledge, of the phenomena of plant life? If this be true, is it not mortgaging the highest possibilities of the future for a mess of pottage to risk in even the smallest degree the powers of a grand profession for the sake of some fifty or sixty hours gained by excluding the subject of botany from the medical student's curriculum? Or at least let the medical authorities be consistent, and, by excising equally the subjects of chemistry, botany, and physiology, the conjoint basis of medicine, send their students out armed with power of life or death, but without even the shadow of a preliminary scientific training.

The PRESIDENT proposed a vote of thanks to Professor Hillhouse for this very interesting and suggestive paper, which commended itself to every student of plant life in connection with *materia medica*.

Dr. TRIMEN said he had listened with very great interest to this paper, and would venture to make a remark on one or two points, although he agreed generally with the author. With regard to the title *materia medica*, he would suggest that the term *pharmacology* should be used instead. Those engaged in pharmacy should remember that the study of drugs was especially the branch which pharmacists must follow very thoroughly; but for medical education this was much less important, and he should be glad to see the *materia medica* course entirely abolished in the education of medical students, and its place taken by therapeutics. The more the action of drugs was separated from the mere knowledge of their origin and structure, the better it would be, and he should be very well satisfied if therapeutics were taught in medical schools, and not pharmacology at all. Botany was a different matter altogether, though he did not altogether agree with Professor Hillhouse in the remarks he had made with regard to the elimination of scientific botany from the ordinary curriculum of medical students. They must look a little at the history of the question, and the different position which the science of botany held now in the medical profession and pharmacy to what it did formerly, when botany first became a part of the medical curriculum. In those days medicine was considered to be almost founded on botany. He was old enough to remember when the kind of botany taught to medical students consisted of recognition of the kind of drugs used in medicine; but he did not consider that very important for medical men to know. Of course it was soon recognised that that was not the kind of botany that ought to be taught, and then there was an attempt to teach in the ordinary summer session of the medical schools a complete course of botany. Of course this was utterly impossible, but in London alone some fifteen courses of lectures were delivered at medical schools, and they each professed to give a complete course of study. The thing was absurd, and he, himself, when he used to lecture at St. Mary's, thought the course was altogether unworthy of the subject, for it was not possible to teach botany as it ought to be taught with the means at their disposal, or the time given to it. During this time botany was making enormous strides, and became more and more a separate science, and at last it was thought that to attempt to teach the whole of such a subject in the medical school was a mistake. If men wished to go in for the science of botany, they might do so, but it was impossible to make it a necessary part of medical school education. In former days

science was looked upon entirely as an appendage to medicine; all scientific men were medical men, their training was that of medical men, and they took to science afterwards from a predilection for it. But that state of things was now gone by, and science was a separate profession, with separate teachers, and a separate mode of teaching, and therefore he could not altogether regret that pure botanical science was lost from the medical curriculum. He should be glad to see medical education confined to anatomy, physiology, pathology, and therapeutics, but with pure science eliminated and relegated to some earlier period of the student's education, between his school period and the time of his introduction to a hospital; but this, of course, was a medical matter hardly to be dwelt upon in that Conference. With regard to physiological studies, the case was widely different. Botany ought to be specially studied by the pharmacologist. That and chemistry were the two principal subjects to which the pharmacist ought to devote his time, and he should like to see botany made for him a much more thoroughgoing course of study than it had been hitherto, and especially, as suggested by the President in his address on the previous day, the study of histology. A histological laboratory ought, in his opinion, to be attached to all pharmaceutical schools. It was of the utmost importance that pharmacists should learn to recognise plants by minute portions of their structures, and all the various vegetable substances used for medical purposes. Students should also be encouraged to go into the history and origin of drugs. He could not speak on this subject without thinking of his old friend, Daniel Hanbury. Of course they could not all be Hanburys, and perhaps it was not desirable that they should; but if more pharmacists would work in his spirit, it would add enormously to the interest of the profession, and to its value.

Mr. HOLMES desired to express his indebtedness to Professor Hillhouse for the very able manner in which he had dealt with this subject. He had long felt that the teaching of botany as conducted during many years past by the old school of botanists was not so practical as it might be. One used to hear of plants, but saw very few of them. Professor Hillhouse represented the modern school, in which attention was paid more particularly to the practical knowledge of plants, and that seemed to him exactly what was required in the study of *materia medica*, and he was very glad that so high an authority had called attention to it. He gathered from the paper that Professor Hillhouse would prefer

the term pharmacognosy, and that was the term generally used now for the study of *materia medica* in that direction. Pharmacology had a different sense in the present day, and was applied rather to medical treatment than to the knowledge of drugs.

Mr. ELBORNE said the term pharmacology as at present used was applied simply to the physiological action of drugs, whilst pharmacognosy referred to the means and processes of ascertaining the purity of drugs used in medicine, and pharmacy of course referred to the alteration of the crude drug into suitable material for medicinal purposes. Consequently the subject of *materia medica* might be divided into three branches, pharmacology, the physiological; pharmacognosy, the means of ascertaining the purity of drugs; and pharmacy, the proper means of preparing them. He quite agreed with Dr. Trimen in dismissing the subject of botany from the course of study of medical students. They had already quite sufficient to do in connection with chemistry, anatomy, and physiology, and his experience of seeing botany taught to medical students was that it was simply a waste of time.

Mr. MARTINDALE agreed with Professor Hillhouse that it was a pity that the subject of therapeutics was now taught before students had any knowledge of drugs, according to the last curriculum issued by the Colleges of Surgeons and Physicians. Every day they saw the effects of want of knowledge of drugs by medical men, and of course a knowledge of *materia medica* could not be attained without having some knowledge of botany. It was possible that in some preliminary scientific examinations, such as those of the London University, botany might still be included, but it was found that life was too short for the ordinary medical practitioner to go through the whole course that was desired, and there were more important subjects than botany in the curing of disease and the treatment of wounds in surgical cases, so that the Medical Council had somewhat given way on this point. Since Pereira's time a great change had taken place in the medical view of the subject. In his day, in the University of London, *materia medica* was the first subject, and Pereira's book had to be ground up by all who passed the examination; he had heard from those who had done so, that that was the hardest work, and of less use to them than anything they did in their student career. Now that this was thrown over by the medical profession in their training, it was all the more important that the pharmacists should take up the subject. He must say that he looked upon the work of the Pharmaceutical Council in the way of working up botany

with regret. It had not pushed the subject to the extent that it might be, especially the histological work, which was not required of the candidates. In the Major examination, histology should certainly form a part of the examination. He was very pleased to have this sketch of what Professor Hillhouse would recommend, which seemed to him a first-class one. It was just such a course that a Major candidate should go through, and would require him to possess such a knowledge of drugs as would make him equal to the pharmacist on the Continent. At present England was very much behind Germany in botanical work. He looked forward to the Council taking up the matter at no distant day, and trying to develop the subject much more than it was at the present time.

Mr. SHENSTONE said he had listened with very great interest to this paper. He did not feel himself competent to criticise it in any way, because personally he had had very little experience in teaching; but he had had some experience in the result of teaching botany, and had always observed one great want, a matter respecting which he sent a contribution to the *Journal* some time ago, that want being a knowledge of how practically to apply the information acquired at lectures. He noticed that large numbers of students who had attended lectures, if they were shown plants presenting distinct characteristics, could give at once the name for the character of any particular organ, and any portion which distinctly came under any botanical term they could name properly. But if they were taken into a field and asked to name the different plants found there, without the aid of illustrations, they had great difficulty in doing so. The characteristics of a plant were not found, except in special cases, to agree exactly with the types as shown in the class room. Every course of teaching in botany ought to include a few practical lessons. Five or six walks in the country with an experienced practical botanist would give a man confidence in the application of the terms he had learnt. The same thing applied to histological work. Unless a man had ordinary material given to him, and had to show how to exhibit the microscopical characters, it did not matter what course of lectures he had attended, he would not be able to do it properly; but a very few lessons of a practical nature would enable him to turn his book-work to advantage.

Mr. ALCOCK said he had very frequently found that pharmaceutical students hated botany, and in the London schools there was very little to assist them in overcoming that hatred. When he attended probably the best course of lectures in London, the

students were shown during the course of three months of histological work two small objects, which of course were very interesting ; but if there had been two hundred, instead of two, they would have been appreciated very much more. The teaching of botany should be thoroughly practical, and not very far from the room in which the Conference was assembled, a well-equipped laboratory could be seen specially set apart for the students of botany. He was surprised to see the number of microscopes and other appliances provided. Every student sat down, and his work was superintended by the professor. Although he had attended good classes in London, he had never seen anything of the sort before. If this were introduced into pharmaceutical schools, he had not the least doubt the embryo pharmacist would learn to like botany very much better. In Birmingham the students and pupils were very well off indeed. They had simply to go to Sutton Coldfield, or if they desired to find a systematic arrangement of plants, to betake themselves to the Cannon Hill Park, or go to the Botanical Gardens, where every facility was afforded. All the material was found for the students, but where were the students? Although they had all these facilities, the students did not come forward as well as they might do ; and he thought if they could infuse, not only into the students, but into the employers, a little more enthusiasm, they would soon have some good botanists in the pharmaceutical world.

Mr. SCHACHT said the subject matter of this address was beyond the sphere of his criticism, but it was very suggestive, and afforded ample material for thought. Throughout it all he was struck with the pervading tone which seemed to supply a very strong argument for a favourite doctrine of his own, which he must be forgiven for repeating, viz., that pharmacy must now and ever be considered as an essential part of the medical art. The various subjects connected with the art of medicine were very numerous, and very important, and it was impossible for any one single mind to comprehend well the whole of them ; and the author of this paper seemed in a thoroughly philosophic vein to contend that it was the duty of the individual to study special subjects rather than that the whole profession should be supposed to be masters of them all. That occurred to him as a strong argument why pharmacists should specially devote themselves to this particular line of study.

The PRESIDENT said he greatly sympathised with Professor Hillhouse's views as expressed in the paper, which contained in it sufficient matter to occupy the whole morning, if not more, but, unfortunately, they could not spare more time to it. He had little

doubt that when there was room in Bloomsbury Square, this subject would receive more attention at the hands of the Council.

Professor HILLHOUSE, in reply, said he felt that in intruding his own opinions on the Conference he had taken a somewhat bold step. The opinions of outsiders were usually disregarded, or if regarded at all, it was with feelings something between contempt and that which was generally excited by impertinence. But this subject was not one which had been concocted alone in the botanical laboratory, or his own private room. His Birmingham friends would bear him out in saying that he had for some time taken a deep and practical interest in pharmaceutical work, and the more he considered the matter, the more he felt sure that pharmacists would, in the long run, have to take up certain portions of work which heretofore had been taken in hand by the so-called medical man. Hence the subject to him was not a new one. He had heard with some sorrow, though not with surprise, that there were many students who had been known to study botany for a certain time, and finish with a sense of cordial hatred to it. He believed that he hated it himself at one time, owing to the fashion in which it was taught. It was the teachers who had been to blame for the results. The results had not been due in any sense to want of interest in the subject, or to want of interest on the part of the students, but almost wholly to the lack of enthusiasm imparted by the teachers, and to the absence of a proper scientific method of teaching. Teaching had progressed, like other things, and it was time to shake free from the old processes, and, with the broadening and re-opening of the subject, to broaden and re-open the method of teaching. He had very little to say on the subject of the discussion, which had been, perhaps, too brief; but on the whole he was not surprised at it, because the paper was not one which would commend itself to instant discussion, and was not written with that view. It was with the hope that it might contain some seeds for a future harvest, that he ventured to lay the paper before the Conference. Perhaps the chief point touched upon was one brought in quite incidentally—viz., the relation between botanical teaching and medical studies; and there he must express his complete and absolute opposition to the view of his friend Dr. Trimen. He started from a slightly different basis. He did not think that the medical man, as a medical man pure and simple, needed to know botany, but, perhaps, in the same sense, he hardly needed half-a-dozen other things he was taught; but if he were to be a scientific man, if he were to look on medicine as a branch of science, he

must start with a scientific training. He ought to give up one year prior to entering on his medical studies to get the basis of a sound scientific training, otherwise he would be simply an empiricist, little better than the old quacks with which the country was at one time filled. Every man who worked with tools, whether of iron or intellectual tools, should understand his tools before he undertook to use them. Bearing in mind the enormous power put by modern legislation into the hands of the doctor, who was qualified to kill if he chose to do it, he thought there had been too much of late of "letting him down easily" in medicine. They had forgotten that the dignity of a great profession was at stake (and that applied, although in a smaller degree, to the profession of the pharmacist), as well as the reputation, life, property, and health of the public; and there ought to be no safeguard left out, no chance door left open for the possibility of the rubbish of the intellectual world getting into a profession which had such enormous powers. It was sometimes said that in the case of a country medical man, he had such comparatively small returns for his labour, that he could not be expected to do so much; but he ventured to suggest that the country practitioner was the one who, of all men, got the most profit from the study of botany, and he was just in the position in which he could study it. However, this was rather wandering from the scope of the Conference, but one could hardly approach the subject without incidentally touching on the subject of medicine. If he had expressed any warm feelings, he must be pardoned, because he felt warmly about it; he had spoken all the more openly because thus far he believed no one had attempted to discuss in plain, simple terms the action of the Medical Council in their recent alterations, and he hoped this communication would not be without some future value, as well as being of present interest.

AN UNOFFICIAL FORMULARY.

The PRESIDENT then called upon Mr. Reynolds to move the resolution to which he had referred on the previous day.

Mr. R. REYNOLDS said if he adopted a somewhat confident tone on the previous day in speaking on the subject of a formulary of non-official remedies as being something desirable, it was from having thought of this matter for a considerable time, from having observed what had been done in other countries, and from feeling

that the matter, when placed before the meeting, fell on receptive soil, and that the President's remarks on the subject met with general approval. Five years ago, when presiding at the York meeting, he alluded to what was done in France in connection with non-official remedies. For some years the Pharmaceutical Society of Paris had taken charge of this subject, in order to obtain uniformity of strength in new preparations, and he recollected using as an illustration the great inconvenience which English pharmacists were feeling from variations in the amount of the acid and the strength of that numerous class, the syrups of the phosphates. It was manifestly most desirable that uniformity should be obtained, especially in the case of new remedies which were going through the stage of probation. If there were a diversity of composition, it was evident that the reputation of any remedy must be judged from a very unfair standard, and that in many cases deserving medicines might get into evil repute from not having been fairly tested. The fact that five or six years ago some consent among pharmacists, who were the most likely to undertake this duty, was found to be necessary, and that it was carried out successfully in France, was a strong argument in its favour. Last year their American friends made a considerable advance in this matter. In the Report of the Pittsburg Meeting of the American Pharmaceutical Association, which only reached England this year, there was an account of what they did on this subject. They accepted a formulary which had been prepared and issued for two years by the pharmacists of New York and Brooklyn, as an appendix to their annual report. This contained eighty-one preparations. The nature of these was of course very much dependent on the nature of American pharmacy. There were fifty-two elixirs, ten emulsions, six syrups, and three wines. The feeling expressed at Pittsburg was unanimous and cordial towards this step being taken, and he felt the greatest confidence, without arguing the whole question, that there was a feeling on the part of English pharmacists that something ought to be done—that the evil was a very great one, that the way in which proprietary medicines were forced on the medical profession, and the way in which medical men were induced to prescribe particular makes, was one which was contrary to the general interests of the body, and very damaging to physicians themselves. The resolution he had to move was this:—

“That in order to secure greater uniformity in composition and strength in non-official remedies, and also to enable the

medical profession to prescribe them with definite knowledge of those qualities, and without indicating any particular maker, the Conference undertakes the preparation of a formulary of non-official remedies."

Mr. S. R. ATKINS seconded the motion. He said the President told them yesterday of the difficulty that a metropolitan or West-end chemist had in keeping a special man, whom he called a "runner," to obtain special information, or the article itself, which might be prescribed by some distinguished London physician. If that were the position of a London dispensing chemist, what must be the unhappy position of the unfortunate country chemist who had not got a runner? Certainly he could wire to London, but the specialty did not come down from London by wire, but by parcel post. Not long since he happened to have four prescriptions handed to him by a lady, who said she would call in an hour and a half for them. Unwisely he did not open them before promising they should be ready; but on opening them after she left, he found they each contained a specialty which unfortunately he had not on the spot, and he had to confess his inability to execute the order within less than forty-eight hours. That was only one instance, but it bore on the question which Mr. Reynolds had raised. There were higher grounds, however, on which it could be put. They wanted accuracy, and they wanted also to set their faces against empiricism. As an educating body, the Pharmaceutical Society had been constantly teaching and preaching this doctrine, and he thought that practically this was a step in the right direction. This would be a kind of extra pharmacopœia. Country chemists were greatly indebted to the 'Extra Pharmacopœia,' but clearly that work, comprehensive as it was in its second edition, had not embraced the whole field of the difficulty. He should listen to the discussion with a great deal of interest; it was a practical question, removed from debatable politics, which were wisely excluded from the discussions of the Conference, and he hoped the motion would receive a large amount of support.

Dr. SYMES supported the motion. He said those who had attended the meetings of the Conference, and had perused the *Year-Book of Pharmacy*, would be aware that this was exactly the resolution which he moved some years ago, when there was no 'Extra Pharmacopœia,' and when they were certainly in a greater difficulty than they were in now with regard to this subject. He then mentioned the case of tincture of gelsemium, which was then largely prescribed, of which there was no official formula,

saying that he made his $\frac{1}{10}$ in 10, having no better indication ; Mr. Umney said he made his $\frac{1}{5}$ in 5, and various other persons mentioned various strengths, whilst others again said they bought it ready made, and did not know what the strength was. He did not think there could be any more forcible argument for the appointment of a committee to consider the matter, and why it remained for Mr. Reynolds to bring this forward he could not say, but he heartily supported the motion. One thing which he had in his mind especially now was *strophanthus*, which was very difficult to obtain, and if a pharmacist obtained the tincture he had no idea what strength it was. When that drug was obtainable, he should like to know what strength they were to make the tincture until there was a new pharmacopœia. The dose ranged from 2 to 6 minims, and if a chemist depended on his own judgment of what strength to make it, it was quite possible there would be far more difference in the strength, and far more serious results than ever existed from the fact that in the *Edinburgh Pharmacopœia* hydrocyanic acid was twice the strength of the *London Pharmacopœia*, though that was a thing which was harped on year after year as showing that there ought to be a *British Pharmacopœia* instead of three separate ones. Those who had the means of communicating with medical men on this subject should do so. The *British Medical Association of Brighton* had recently formed a committee for considering therapeutically the value of new drugs, and he thought it very opportune that the Conference should on the present occasion form some kind of committee for considering the value of these, and should be in a position to work hand in hand with that Committee, and have the whole subject thoroughly threshed out. By such means the Conference would become better known to the medical profession, and it would help to impress on the *Medical Council* the necessity for members of the pharmaceutical body being on the *Pharmacopœia Committee*.

Mr. MARTINDALE cordially supported the motion. He said, seeing there were agencies at work scouring creation to get new drugs if they could, it was very important that there should be a means of getting uniform strength in these new preparations. They knew the result of his own efforts in this direction. He was placed in such a position that a great number of medical men called on him to know something about new drugs ; having been brought so much in connection with them during his five years' hospital experience, he became looked upon somewhat as an authority. He found such a variety of strengths of preparations

existed, that it was necessary to compile a pharmacopœia of his own, an extra pharmacopœia, containing the strength of many preparations which were non-official at the time of its compilation. He was glad to say it had been fairly recognised by medical men, and by chemists also to a great extent. As Dr. Symes had said, this was one of the best means of pressing their claim on the Medical Council. It was in effect saying to them, If you will not give us the right to make the Pharmacopœia, we will make one of our own. They knew how to make preparations to suit the public taste, and it was absurd to say that only such and such things should be used when pharmacists knew how to make them more palatable. To suppose that people would continue to take nasty drugs was an absurdity, if what was known as elegant pharmacy, or something more palatable, was obtainable. At Brighton reports were given from a Collective Investigation Committee of the section of Pharmacognosy and Therapeutics on two drugs this year. They were only preliminary reports, and the drugs were hamamelis and terebene. This Committee was undertaking a therapeutic investigation of the new drugs with the intention of seeing whether they could be admitted into the Pharmacopœia or not, and, as Dr. Symes had said, it was quite a proper movement for pharmacists to adopt some such suggestion as Mr. Reynolds had thrown out in making preparations suitable for trial and experiment. It was said at Brighton that some of the reports applied to nostrums as well as to more popular public formulæ. Some secret preparations even were recommended as having special virtues, but on the question of hamamelis, the report was to the effect that all the preparations seemed to have medicinal virtues. There was one class of preparation, to which the President had referred particularly on the previous day, which caused the greatest trouble, such as the mist. magnesiæ cum bismutho, with all the Pharmacopœia comprised into a little dose. It was a great loss to a chemist to have to buy a half-guinea bottle in order to give out one dose.

Mr. SCHACHT said there were a great many things which were desirable which they had to do without. No doubt what Mr. Reynolds suggested was an extremely desirable thing to undertake, but he was not quite sure that he saw his way to the existing machinery by which it could be carried out by that Conference. When the American book came into his hands a few days ago, he thought the idea a most valuable one; but it also occurred to him immediately that the body from which such a book should emanate was rather the Pharmaceutical Society of Great Britain than the

Pharmaceutical Conference, and for this reason, that he hardly saw the possibility of the Conference framing such machinery as would bring about such a result. A large amount of experimental work would have to be carried out, and he could appeal to no better person than to Mr. Martindale as to this fact. If so, where was the home where this work could be done? If Mr. Reynolds's suggestion was that a committee of private individuals be appointed who should work out different parts of it in their own private laboratories, he feared the work would lose a great deal of its value; he should hope that such a work would be produced by the joint labours of a specially qualified committee, working together, and seeing the results themselves. Such results could only be obtained by a body having a home of its own, and somebody to whom it was responsible. He was not opposing the motion, but he should like to know how it was to be carried out.

Mr. ROBINSON asked, if this suggestion were carried out, how it would affect the issue of the *Year-Book of Pharmacy*. He thought that book was intended to qualify and bring to notice new preparations which had been discovered. Was it proposed to issue yearly an extra pharmacopœia, with all the new remedies, stating what was their proper strength? Would the resolution pledge the Conference to the desirability of issuing a new Pharmacopœia, or did it refer the consideration of the question to a committee? It would be an excellent thing if pharmacists could have more information about new remedies, and they were much indebted to Mr. Martindale for the "Extra Pharmacopœia," but when gentlemen possessed special knowledge of a drug, it was surely right they should have their reward in the special preparation and sale of it. It would be extremely kind if they placed that knowledge at the disposal of all, but it occurred to him that if they knew their special information was to be given away, it might influence their communication to this Committee.

Mr. INCE very cordially supported the resolution. One objection had occurred to his mind as a difficulty in the case, but that had been entirely removed by Mr. Martindale. He had feared that he might raise some slight objection that this was rather taking out of his hands a work which he had done so extremely well; but as Mr. Martindale had supported the resolution, any objection on that score was at an end, and he thought that they were bound publicly to compliment that gentleman on the generosity of his action. With regard to the method of bringing this about, of course that was not easily determined. The machinery was not cut and dried,

but he was quite sure Mr. Reynolds, and those who might be associated with him, would in proper time devise new machinery for effecting this purpose. He would not ask him at that moment to give a full detailed account of the whole process, but he was decidedly of opinion that the Conference was the body which should undertake it. It was hopeless to look forward to such a proposal being brought forward and put in hand by the authorities who were entrusted with the compilation of the British Pharmacopœia, because from their very position they could not do that which was now suggested. They acted by authority; all their work, as soon as published, was by authority; every pharmacist was bound to obey it, and therefore they were compelled to take considerable care in what they did. That very care was one reason why their work must always be so long delayed, and so exceedingly guarded. But that objection was removed altogether if the work were undertaken by the British Pharmaceutical Conference. Its members had experience, knowledge, acquaintance with drugs, common sense, and very large facilities afforded for receiving information, and they could produce it at convenient periods, at any dates which might be thought requisite, and they could do so with confidence, because they were acting for the best. As British pharmacists they were supposed to know their subject, but every year they knew it better; they had facilities for obtaining this class of information, and were able to bring it before the world of pharmacy at short dates, without so much consideration or delay as must always be the case with the official publication. There was another reason why he should be glad for the Conference to undertake this task. All over England he heard remarks made constantly that they met together, and he hoped they long would, for social enjoyment. Of course they did; that in itself was a good thing; but there was an impression that that was the beginning and end of their association. This would be a proof, and a striking proof, which no man could get over, that at all events the Conference was not merely intended for social pleasures, but that it could come before the public and justify its existence by having done something.

Mr. MARTINDALE said he still saw a field for his "Extra Pharmacopœia" as distinguished from the other publication. The one would correspond to what was known in France as "Bouchardat's Formulaire Magistral." He could quite see that the Unofficial Formulary would not interfere much with his work, though perhaps it would a little, but he should be very glad to allow the members of the

Conference and the Society generally to have the advantage of anything they like to take from it. He was inclined to think with Mr. Ince and Mr. Reynolds, that it would be better for the Pharmaceutical Conference to do the work. The Pharmaceutical Society had to come too much in contact with the Medical Council in certain ways. The Conference was not bound by the Medical Council in any way, and could take the matter in hand without asking any permission. There was a certain amount of pharmaceutical as well as analytical work to be done. That was a detail which could be regulated by the Committee.

Mr. ATKINS said he should be glad of a little more light on the question as to where the work was to be done. He was entirely in accord with previous speakers in preferring that it should be done by the Conference rather than by the Society, but he still wanted to know where the practical operations were to be conducted.

Mr. NAYLOR said he had no intention to offer the slightest opposition to this motion, but he did see a difficulty in the way. They would be understood to be doing this upon the ground of counteracting what they were pleased to call the evil effects of proprietary medicines; at any rate, those proprietary articles that come under the definition of non-official remedies, one or two instances of which had been referred to. It seemed to him that in so doing the members of the Conference would place themselves in a somewhat inconsistent position, unless they were, as a body, prepared to be perfectly frank and generous in this matter. There were a great many gentlemen present who remunerated themselves from non-official remedies. If these gentlemen were prepared to place their knowledge at the command of the Conference, or rather through the Conference at the command of the profession, then they were in a perfectly logical position; but he did think there would be a degree of distrust in selecting certain preparations to be put into this compilation, whilst members of the Conference were still reaping the benefit of certain proprietary articles themselves. Then there was a question whether a corporate body would feel that it was in that sense responsible for the individual action of certain members. He did not want to say one word against proprietary articles. If some method could be devised by which a proper selection could be made: if they were to use a new remedy which was known to all, which had received the sanction of the medical profession, but of which there was no authoritative formula in the Pharmacopœia, then he was quite in accord with the motion; but it seemed to him that it covered rather too wide a ground.

Dr. SYMES said he should take exception altogether to Mr. Naylor's position, or, rather, to the Committee working as Mr. Naylor understood it was to do.

Mr. MARTIN said that Mr. Naylor had quite misunderstood the drift of the resolution. It was not to publish the formulæ of secret remedies, but to counteract want of uniformity in the preparations of new drugs. He might refer to the case of *jaborandi*. They were frequently called upon to dispense *jaborandi*, when they had either to prepare the tincture or buy it ready made. In neither case had they the slightest idea of the strength of spirit used or the strength of the preparation. As he understood the motion, the object was to publish authoritative formulæ for such preparations, but in no way to analyse *mistura magnesiæ cum bismutho* (Jones), and publish that formula. With regard to carrying out the resolution, it occurred to him some difficulty would arise with regard to the expenses, but the Pharmaceutical Society was about to endow a research laboratory which would be open to members of the Society, and that would be available to members of the Committee who might be appointed, or to any delegate working under their direction, for the purpose of carrying out such experiments as might be rendered necessary in the progress of the work. On the whole, he cordially supported the motion.

Mr. LASCELLES-SCOTT supported the general object of the motion, but suggested that as far as possible the Conference should try to confine itself to the general subject, without attempting, for several reasons, to decide how the result should be accomplished. The moment it was agreed that such an object was desirable, an unanimous vote would be passed in its favour; but the subject would be so replete with difficulties on mere matters of detail—although they might be difficulties which would clear away after a time, by the process of natural selection—that he thought it would be well to keep only one or two objects firmly in view, viz., that it was desirable that the general terms of the motion should be confirmed with as hearty and unanimous a voice as possible, and that a Committee should be formed to report upon the subject to next year's Conference. This Committee should not trouble itself at first with these minor details, since at present they were only rocks ahead, which, however, by-and-by might become the firm bases of further action. It had been suggested that this was a subject which should be taken up by the Pharmaceutical Society; but with all due deference thereto, he thought

from all he heard that that Society would hardly do justice to the subject—not from want of means, or from want of genius amongst the Council, or the members, but because it was so tied down by hard and fast rules, and by unwritten laws, which were even more inconvenient, that they would find themselves at loggerheads with the Government, with the Medical Council, and with the trade within six months, if they attempted to do anything of this kind. In order to dissociate what they wanted and had a right to hope for from what they did not want, it should go forth to the world in the most distinct terms that the Conference did not propose in any shape or form to interfere with proprietary medicines or with mixtures of any kind. They should deal with preparations pure and simple, such, for instance, as urethan, terebene, or any drug or alkaloid containing, so far as they knew, only one substance, and tinctures, etc., prepared from it; but when they came to the mingling of two distinct medicinal substances together, all such should be dissociated entirely from the motion.

Mr. GROVES thought it would be useless for the Conference to proceed unless it worked in accordance with the wishes and feeling of the medical profession. The difficulty was occasioned principally by doctors writing for proprietary articles, and attaching names, and unless they could be induced to discontinue that practice, he did not see what benefit would result from having the suggested non-official formulary. He should prefer to adopt the suggestion of Mr. Scott, and defer the further consideration of the subject for a year, or else that the Conference should approach the Pharmaceutical Council on the subject. By doing that, first of all, it would get the use of a laboratory in which to conduct experiments, and having an official connection with the Pharmaceutical Society, the Committee might perhaps approach the British Medical Association, and obtain some practical result.

Mr. SOUTHALL, as a country pharmacist, thought it would be a great advantage if something in the way of an official formulary for certain tinctures and remedies could be prepared. This would not at all interfere with anything Mr. Martindale might publish. He published a great deal more than this Committee were likely to do; the Committee would rather give an official standing to the preparations, to the processes, and to the dose. Pharmacists often had mixtures brought back which perhaps were not very different, but had been differently prepared by another pharmacist.

Mr. HAMPSON supported the motion, which he thought pointed to the kind of work which ought to be undertaken by the Con-

ference. If the work were satisfactorily done, the formulæ introduced under the seal of the Conference would be in the course of a short time accepted, not only by pharmacists, but by medical men; and if the medical men of the country accepted these formulæ as something like safeguards in prescribing, that would do away with a certain cupboard into which they were in the habit of putting obsolete and useless preparations. He had described that cupboard as the "chamber of horrors," because it seemed to him that was the proper designation for it. As had been observed, frequently pharmacists had to buy expensive bottles of this class of preparations, perhaps for one prescription, and after having used small portions, they put them into this chamber, from whence they never came out again. He hoped this chamber would speedily be abolished, and that there would be something like proper formulæ sanctioned by an authoritative body. One other remark he might perhaps be allowed to make. He and others were extremely desirous that pharmacists should be allowed to take their proper position with respect to the national Pharmacopœia, and it appeared to him if they showed they were able to prepare these formulæ, and these were accepted as standards for the various new medicines as they came out, they would have adopted the first practical step to show their ability in framing a national Pharmacopœia.

Mr. WILLMOTT said the same idea occurred to him as had been mentioned by Mr. Groves. They seemed to be altogether ignoring the British Pharmacopœia. He remembered that Professor Attfeld endeavoured to show that the British Pharmacopœia was really the work of British pharmacists, by referring to the different papers written on the preparations which were subsequently criticised in the Journal; nevertheless, they appeared to require an extra pharmacopœia. With regard to preparations such as terebene, and so forth, the work now in contemplation was already exceedingly well done, and he did not know that much improvement could be made, but it was these proprietary preparations which constituted the chief difficulty. When a medical man ordered a proprietary preparation, he did so presumably because he had faith in that preparation, and if he should still order *mist. bismuthi*, Jones, or *liquor pepsini*, Robinson, could any other preparation be properly substituted? Unless that difficulty be met in some way, he feared such a publication would become a dead letter.

Mr. REYNOLDS, in reply, said it was very gratifying to find that the *consensus* of approval of his resolution had been so great, and

not the less gratifying that it was an intelligent approval, because questions were suggested, and gentlemen wished to see their way clearly before taking the responsible step of joining in such an action. Mr. Schacht asked how this could be carried out. In the motion affirming the principle, very naturally no attempt had been made at furnishing details, but Mr. Williams would, he was sure, allow him to say a word or two on the subject on which he was to move a resolution, *viz.*, that a Committee of ten representative pharmacists should be nominated. He believed those names would command confidence whatever subject was placed in their hands. Those gentlemen had been able in the past to do a great deal of work, and they did not require a central laboratory and official staff. He was inclined to think that the larger amount of work came from private individuals. He did not find many papers dated from 17, Bloomsbury Square; he wished there were more, but certainly it might encourage Bloomsbury Square to put its oar in, when a crew were taking such a voyage as this. He thought it was feasible as far as work went, and Mr. Williams's motion would accord supremacy to the Executive Committee. There would be a request for a very few pounds in money to pay the necessary expenses. Mr. Robinson spoke of the *Year-Book*, and inquired whether it would not be superseded. The *Year-Book* brought to their notice the inconsistency of their present position, because it put side by side the various formulæ, and the various strengths for things which passed under the same name. If at the end of the *Year-Book* they saw, as the Americans now had, the official formulæ, they would know what had weight, and that others had merely the individual authority of the gentlemen who first suggested them. An annual revision would certainly be desirable. The rapidity with which elegant pharmacy, making medicines as pleasant as they could be made, progressed, would render that necessary. The Pharmacopœia did not do that, and other things were introduced as more pleasant substitutes. Mr. Groves spoke of its being necessary to induce doctors to give up prescribing proprietary articles, but the best way to do that was to put a good substitute before them. At present they said, "What can we do? We want to cure our patients. Smith and Jones declare their elixirs cure everything," and the doctors unfortunately fall in with it. The argument, which had evidently affected some speakers, that they were taking a most important step, thus exhibiting their fitness to a voice in the national Pharmacopœia, was one of the strongest in favour of the present

resolution, and he was quite sure, as a matter of policy, that it was a wise thing to do.

The PRESIDENT having read the motion, put it to the meeting, and it was carried *nem. con.*

Mr. WILLIAMS said Dr. Symes complained that when he brought this subject before the Conference some years ago, and obtained a vote, it went no further, but the Conference this year was taking a considerable step in advance of all former Conferences. In the President's Address the abstract was brought into the concrete, and they had really something of a tangible character to argue about. The Committee which he was about to propose would at any rate have a tangible existence, and he hoped would not come to the same conclusion, or no conclusion, which Dr. Symes complained of on the former occasion. Mr. Reynolds had so completely gone into the matter, that it was quite unnecessary to say much upon the general question, but one point only he might allude to. The Pharmaceutical Society had been mentioned as being more properly fitted for carrying out investigations of this character, and for giving them an official position. He had strongly supported on a great many occasions the suggestion that the Pharmaceutical Society should carry on researches in pharmacy proper, and he hoped that it would shortly take up the matter in a more serious manner than hitherto, and perhaps obtain important results. He was sure the members of the Conference would not feel jealous of the Society, but would be very glad to obtain information from any source possible; but he was beginning to fear that the Society would not be able to carry out to any great extent this proposal. The truth was that the educational duties of the Society would, he feared, swamp the merely abstract research question, and he began to fear that the two were almost incompatible. The Conference was not in any way bound up with educational requirements, and was, therefore, more at liberty. If they could spend money enough, and could utilize the co-operation of gentlemen who would undertake the serious work before them, they might perhaps be able to carry out that which he was very anxious to see performed. The motion was as follows:—

“That the following, with power to add to their number, be the Committee for preparing a Formulary of Non-Official Remedies to report to the Executive Committee, and that the sum of £25 be placed at their disposal for expenses: Messrs. Greenish, T. B. Groves, Martindale, Symes, Thresh, N. H. Martin, W. A. H. Naylor, Maben, A. C. Abraham, and R. Reynolds.”

Mr. HAMPSON, in seconding the motion, said the Pharmaceutical Society could help very much in this matter. For instance, if it were found that £25 was not enough, the Conference might very graciously apply to the Society for a grant of £100, and he was quite sure the Society would do good work in helping on such a very important undertaking as that now initiated.

Dr. SYMES said Mr. Hampson must be aware that the Council would have no power to make a grant of money to the Conference for any special work. As he had not an opportunity of speaking just now in reply to Mr. Naylor, he wished to say he thoroughly agreed with Mr. Williams's motion, and should be happy to join the Committee, and do the best he could, but he should certainly not join it if he thought the object was to publish a little book which was to rob Mr. Martindale of the fruits of the labour he had expended in the production of his. Neither should he join it if he thought the object was to rob pharmacists of the labour they had expended on some particular preparation. The same principle applied in both interests. The object of the Committee was to do good, broad work, not to set about to imitate preparations, but to indicate formulæ by which well-known preparations could be well prepared, and to give a sort of semi-official character to them. Even referring to Mr. Martindale, or to the makers of any good special preparation, they should, by the official work in an independent and liberal manner, be doing them much less harm than private individuals who lived on other men's brains, by attempting to imitate their preparations. He thought there was plenty of room for the Committee to act without encroaching on any person's rights, either as a maker of preparations or a publisher of books.

Mr. BARRON, as a country chemist, said he hoped it would be made clear what the Committee were going to do. Hosts of things were foisted on the profession as drugs, which were, in fact, secret remedies, and he was afraid very often a great deal of the charm was in the mystery. It would be a great boon if a large number of these preparations could be analysed, and people could know something about them. A year or so ago a prescription with bromidia in it was brought to him. He was quite at sea, and all his brethren in the town were equally so. The medical man said he knew nothing about it, only that he had been told it was efficacious for a certain class of disease. He was unaware himself that it was a proprietary secret nostrum, prepared by enterprising men, who were really destroying the chemists'

business. He did not want to behave dishonourably in any way, and if syrup of hypophosphites (Fellowes) were prescribed, no honest man would use other than what was ordered; but at the same time he thought if a formula was published showing the composition of Fellowes's syrup, a great many medical men would order that instead of the proprietary article. Although some gentlemen had spoken strongly on the matter, to the trade at large it would be a great boon if everything that was prescribed by medical men could be supplied by every chemist.

Mr. SYMONS asked if the financial condition of the Conference would permit of an outlay of £25, and also if the vote would be binding on the Executive Committee.

The PRESIDENT said the resolution would unquestionably bind the Committee. It was to be hoped that the usefulness of the formulary as it progressed would induce a great many persons not now members to join the Conference, and thus add to its stability and financial means. The President then put the motion, which was carried *nem. con.*

The reading of papers was then resumed:

NOTE ON THE PREPARATIONS OF NUX VOMICA IN THE BRITISH PHARMACOPŒIA.

BY N. H. MARTIN, F.L.S.

Following the results of the scientific investigation of nux vomica by Messrs. Dunstan and Short, a new departure has been taken with regard to its two galenical preparations in our Pharmacopœia, and these are for the first time ordered to be made of a definite alkaloidal strength, the extract to contain a total of 15 per cent. of the mixed alkaloids strychnine and brucine, and the tincture to contain 1 grain of alkaloid per ounce. As the latter is ordered to be prepared by dissolving the extract in a mixture of spirit and water, it is presumed the alteration in colour, rather than in any other quality of the new tincture, was the cause of the frequent remarks made by physicians and others who prescribed it. For some time this caused me no surprise, but when, so lately as early in June of the present year, more than nine months after the publication of the Pharmacopœia, inquiries were still addressed to my firm as to the reason why our tincture was different in colour

from that of some other makers, presumably purchased about the same time, it occurred to me that it might not be uninteresting or altogether profitless to collect samples of the tincture from chemists in different parts of the country, and to ascertain by analysis, in the first place, to what extent the new Pharmacopœia processes are followed, and, in the second place, whether the object of standardization, viz., uniformity, had been attained by the method adopted for carrying it into effect. Twenty-five samples of the tincture were collected for me by means of prescriptions written for "Tinct. Nucis Vomice, 3ij," in towns between Falmouth and Newcastle-upon-Tyne, and the result, so far as the tincture is concerned, may be considered to represent fairly the condition of the preparations as found in our pharmacies at the present time.

In the examination of the samples so obtained, the method of procedure was as follows:—First, the specific gravities of the tinctures were taken, then a portion was evaporated over a water-bath until it ceased to lose weight, in order to ascertain the percentage of extract, and, finally, the total alkaloids were estimated by the second process given by Messrs. Dunstan and Short in their report of tincture of nux vomica (*Pharm. Journ.* [3], xiv., 292); that is to say, the tincture was evaporated, the residue treated with dilute sulphuric acid, and after the addition of ammonium hydrate, the alkaloids extracted by chloroform. The results are given in the following tables. The first table includes eleven tinctures, which, from their colour, were evidently prepared direct from nux vomica seeds; and the second table fourteen samples, which equally bear evidence of having been prepared by the method directed in the Pharmacopœia.

Analyses of Tinctures of Nux Vomica of a pale yellow colour.

No.	Specific Gravity at 60° F.	Percentage of Dry Extract.	Percentage of total Alkaloids.
1	0·8365	·84	·157
2	0·8378	·56	·137
3	0·8408	·80	·137
4	0·8422	1·04	·187
5	0·8433	·62	·119
6	0·8434	·62	·214
7	0·8474	1·27	·285
8	0·8516	1·18	·279
9	0·8552	·94	·242
10	0·8864	1·31	·288
11	0·8892	1·20	·212

Nine of the tinctures in the first table have a specific gravity ranging from '8365 to '8552, dry extract from '56 to 1'31 per cent., and total alkaloids of '119 to '285 per cent. Messrs. Dunstan and Short, in the paper above quoted, found an analysis of twelve samples give specific gravity from '8377 to '8552, and total alkaloids from '124 to '360 per cent. The other tinctures, Nos. 10 and 11, were manifestly prepared with a diluted spirit of about the strength ordered in the new Pharmacopœia, but as the colour coincided with the old preparation, I have put them in this table. The second table gives the results of the examination of the fourteen tinctures, which from their colour and specific gravity have evidently been prepared in the manner directed in the Pharmacopœia, and we find a specific gravity ranging from '8804 to '8965, dry extract from '96 to 1'34 per cent., and total alkaloids from '196 to '313 per cent. The variation in the strength of the alkaloids is not so great as in the first table, or in that of Messrs. Dunstan and Short; but it is worthy of a moment's reflection, that whereas in my first table seven out of eleven, and in Messrs. Dunstan and Short's table eight out of twelve samples are below the standard of the Pharmacopœia, in the second table which I give, ten samples out of fourteen are stronger than the Pharmacopœia standard; and it is quite conceivable that in a couple of years the variation will be as large as under the old Pharmacopœia, and with the tendency to a greater potency, which in this particular drug will be attended with at least as great danger and inconvenience to the public health.

Analyses of Tinctures of Nux Vomica of a light brown colour.

No.	Specific Gravity at 60° F.	Percentage of Dry extract.	Percentage of Total Alkaloids.
1	0'8804	1'00	'281
2	0'8818	1'18	'274
3	0'8824	'96	'196
4	0'8836	1'13	'242
5	0'8866	1'29	'219
6	0'8866	1'08	'313
7	0'8872	'98	'214
8	0'8880	1'24	'276
9	0'8902	1'27	'285
10	0'8914	1'16	'278
11	0'8922	1'21	'196
12	0'8925	1'25	'256
13	0'8933	1'03	'242
14	0'8965	1'34	'231

It will be seen from the details I have given that more than one-third of the tinctures in use are still prepared according to the old Pharmacopœia, and that with regard to the remainder, the important feature in a typical tincture of nux vomica, uniformity in alkaloidal strength, has not been attained by the process suggested by Messrs. Dunstan and Short, and made official in the Pharmacopœia.

Turning to the other preparation of nux vomica, I regret the time at my disposal has not permitted me to collect and analyse a similar series of samples of the extract; but some experiments I made, taken in conjunction with the second table of tinctures given above, and with the table in Messrs. Dunstan and Short's paper on "Extract of Nux Vomica" (*Pharm. Journ.* [3], xiv., 443), lead to the conclusion that the process devised by them and adopted in the Pharmacopœia yields a preparation so unstable that to call it a standardized preparation is misleading. This instability, of course, depends upon the hygroscopic properties of the freshly evaporated extract.

In reproducing Messrs. Dunstan and Short's table, I have added another column, to give the percentage of dry extract, and have altered the sequence of the numbers, so as to make the column of total alkaloids an ascending scale from the lowest to the highest percentage. Thus arranged it will be seen at a glance that although there is a difference between the highest and the lowest total alkaloids of 7.21 per cent., no such difference is seen in the column of dry extract; in fact, the highest percentage of alkaloids is yielded by 2.3 per cent. less of dry extract than the lowest. The inference from this is perfectly clear, that so far as published evidence shows, there exists no relation between the amount of extractive matter and the amount of total alkaloids existing in different samples of nux vomica. The consequence is that we may have a sample rich in extractive but poor in alkaloids, like No. 4 (No. 1 is too poor to be possibly brought to the standard); and in order to bring this to the standard alkaloidal strength, it must be evaporated to a condition in which it is exceedingly hygroscopic and will rapidly deteriorate in strength by absorption of moisture. No. 11 of the tinctures may have been made from such an extract. On the other hand, we may have a sample rich in alkaloid but comparatively poor in extractive, and this would have so large a percentage of moisture left in the finished product that it would be almost sure to become stronger under the ordinary conditions of storage and use. The tincture

No. 1 may have been prepared from an extract of this class. My own experiments upon the extract also confirm this view. Four samples have been obtained from different sources and assayed by the Pharmacopœia process. The first contained 16·3 per cent. of total alkaloids. This extract, evaporated over a water-bath until it ceased to lose weight, yielded 15·2 per cent. of moisture, and on exposing the dried extract to the air it reabsorbed 16·2 per cent. of moisture. The second sample contained 15·0 per cent. of total alkaloids, yielded 8·9 per cent. of moisture, and reabsorbed 12 per cent. The third sample contained 16·6 per cent. of alkaloids, yielded 12·7 per cent. of moisture, and reabsorbed 14 per cent. The fourth contained 16·8 per cent. of alkaloids, yielded 10 per cent. of moisture, and reabsorbed 16·8 per cent.

Messrs. Dunstan and Short's Table of Analyses of Extracts of Nux Vomica, with column showing Percentage of Dry Extract.

No.	Percentage of Moisture.	Percentage of Dry Extract.	Percentage of total Alkaloid.	Percentage of Strychnine.	Percentage of Brucine.
1	15·5	84·5	10·32	4·19	6·13
2	13·8	86·2	12·25	4·87	7·38
3	16·0	84·0	12·49	5·53	6·96
4	13·9	86·1	12·53	5·17	7·36
5	16·7	83·3	15·15	6·63	8·52
6	15·7	84·3	15·16	7·08	8·08
7	19·7	80·3	15·64	7·44	8·20
8	13·6	86·4	15·78	6·41	9·37
9	16·0	84·0	15·94	6·84	9·10
10	17·3	82·7	16·24	5·81	10·43
11	15·9	84·1	17·12	8·58	8·54
12	17·8	82·2	17·54	7·52	10·02

I wish I had time to carry these experiments further, but they are sufficient to prove the instability I have before mentioned. It requires no stretch of the imagination to suppose a chemist to have assayed his extract in the morning, and on being called upon on the evening of the same day to dispense a prescription containing it, to be guilty of using a preparation of either greater or less potency than the Pharmacopœia standard.

I must not be understood to underrate in the least degree the value of the work done by Messrs. Dunstan and Short upon this subject. I only regret they did not include amongst the objects of their investigation an exhaustive pharmaceutical, as well as "chemical and botanical" analysis of a sufficient series of samples of nux vomica, seeing that the practical object of their research

was "to devise processes for the production of standard galenical preparations, whereby the therapeutic action of these preparations shall be rendered as far as possible definite" (*Pharm. Journ.* [3], xv., 157). If they had done this, I think they would have been more disposed to endorse Mr. Schacht's statement that "without a great deal more knowledge than I think any one is at present possessed of, any attempts to standardize the medical potency of extract of *nux vomica* must be fallacious" (*Pharm. Journ.* [3], xiv., 851).

The PRESIDENT having moved a vote of thanks to Mr. Martin,—

Mr. SCHACHT said he was not aware that Mr. Martin was investigating this subject, but he was glad to find that he agreed with him as to the difficulties which surrounded it, and in highly estimating the work done by the two gentlemen who had laboured so hard to unravel the problem. He rather thought his chief objection to the arguments of Messrs. Dunstan and Short was that they had scarcely sufficient ground for declaring the alkaloidal strength to represent the real potency of *nux vomica* and its preparations, alkaloidal strength being understood to include the alkaloids strychnine and brucine, whereas as yet no therapeutic authority had declared what was the medical potentiality of brucine. The fact that different samples of *nux vomica* afforded very different proportions of these two alkaloids ought also to be considered; so that although the total alkaloidal strength of two samples might be nearly identical, their medical efficacy might be very different, because one might contain a larger percentage of the more powerful alkaloid than the other. Mr. Martin's experience seemed to have led him to the conclusion that there was another source of difficulty in this intricate subject, and he was very glad to find that he did not wish to throw cold water on the previous investigations, but rather to indicate the direction in which further knowledge was required.

Mr. CONROY fully appreciated the work done on *nux vomica* by Messrs. Dunstan and Short, but at the same time he considered it a mistake pharmaceutically to prepare the tincture from the extract. The extract being made by heat, the natural combination of the alkaloids and acid was injured. It would be far preferable to make the tincture direct from the seeds in the old way, and adjust it to the strength required. He could fully endorse what Mr. Martin had said about the strength. Working on large quantities, he had found the product from one parcel form a stiff extract

when of the right alkaloidal strength, whereas that from another would form a thin extract. Of course a thin extract under ordinary conditions would lose moisture, and become much more potent.

Mr. H. W. JONES said he had had several cases brought to his notice in which the colour of this tincture had varied from a pale greenish tint to a very dark brown, showing that it was prepared directly from the seed, which gave a pale tincture, or from very varying qualities of extract. In the extracts in the market the difference might partly be accounted for by the quantity operated upon. If the extract were made on a small scale, a very light product was obtained, but if a large quantity was operated upon, and the heating process in the distillation had to be continued a longer time, the product was a much darker extract. In dissolving up the extract in the spirit, he had found it absolutely necessary to make a final analysis of the tincture, in order to get the exact strength. He agreed with Mr. Conroy that it was preferable to work directly on the seed.

Mr. MACKENZIE asked if Mr. Martin was satisfied that from a therapeutic point of view the old tincture was better than the new.

Mr. ALCOCK agreed with Mr. Conroy that the best way to prepare the tincture would be directly from the seeds, but the seeds should be very carefully manipulated first of all. The composition of these seeds was supposed to be this—that the alkaloids strychnine and brucine were combined with igasuric acid; this was a very delicate acid, and if the solution were left for any length of time, or were exposed to heat, it might undergo a change; some thought it might form lactic acid; at any rate it was a delicate acid, and so much evaporating might probably alter it entirely. They knew that the alkaloid strychnine might be heated for a long time in conjunction with strong sulphuric acid, so that that would not be affected. Probably the variability in the colour of the extract which Mr. Jones had spoken of might arise from this delicate acid having undergone some change during the process of evaporation. Some time ago he had to assay an extract, and found that it contained a quantity of chlorophyll, or what seemed to be chlorophyll; it might have come from seed, though he was not quite sure, but he would suggest that that might account for the peculiar greenish tinge which some of these tinctures had.

Mr. MARTIN, in reply to the question whether he had formed any opinion as to the therapeutical value of the old tincture as compared with the new, said his researches were undertaken purely from a pharmaceutical point of view, and he had had no

opportunity of judging of the therapeutical effect. In reply to Mr. Schacht, he would say that he had carefully avoided the subject of standardization, and the question of whether it was wise to adopt the total alkaloidal strength or the total strychnine or brucine as the standard. That had been dealt with exhaustively in the paper read by Mr. Schacht soon after Messrs. Dunstan and Short's, and it lay outside the scope of his small note to go into the question, but he believed it had been stated by a recent authority that experimenting with pure brucine put into his hands by a chemist, it proved wholly inert when given to rats. If this were so, the question whether it was advisable to take the total alkaloids or strychnine only as the standard became very important. The whole scope of his paper was to show that the method adopted in the British Pharmacopœia for standardizing these preparations was fallacious.

The next paper read was :—

NOTE ON THE PRESERVATION OF ETHYL NITRITE.

BY JOHN WILLIAMS, F.C.S., F.I.C.

For some time past I have been trying various plans with the view of making a solution of nitrite of ethyl, which should be of definite strength and which should be fairly permanent.

None of my previous experiments have yielded results quite satisfactory, and I have lately tried glycerine, and I think with promising results, although sufficient time has not yet elapsed for me to speak positively.

It may be remembered that glycerine is already known to possess preservative properties, in some cases in a very high degree. Thus sulphuretted hydrogen condensed into pure water rapidly decomposes, but if about a third of the weight of glycerine be added to the water, the H_2S can be preserved for many months without sensible change.

So with hydrocyanic acid, it may be in the memory of some members of this Conference that I pointed out at a meeting some seven or eight years ago with what effect this agent could be used as a preservative of the acid, and the result of some years' experience has quite confirmed the views I then put forward. Thus a solution containing 25 per cent. glycerine and 25 per cent. acid was prepared. This has been kept under ordinary conditions in a

stoppered bottle, exposed to diffused light; for some years it retained its strength unimpaired, and it was again examined a week or two back, when after so many years it was found not to have become in any way discoloured, and to contain even now 12 per cent. of real acid. This, I think, is as good a result as could fairly be expected.

With nitrite of ethyl I have adopted the following plan:—A mixture of 1 part pure glycerine, and 2 parts of pure absolute alcohol was made. A given quantity of this liquid being taken, pure dry gaseous nitrite of ethyl was condensed with it to any extent desired by weight, so that a 5 per cent. or 10 per cent., or stronger solution could easily be made, the increase in weight from the absorption of the gas being the ready mode of obtaining the percentage. It was found that this liquid alcoholic glycerine could not be made to take up more than between 15 and 16 per cent. of the gas, the excess passing through, but not increasing the weight in any perceptible degree; doubtless if condensation aided by great cold was tried, more gas could readily be got into the liquid if it was considered desirable.

The following table shows the results obtained up to the present time:—

Strength of Solution as originally estimated by the passage of the gas.	Specific Gravity.	Amount of NO yielded (by the nitrometer) of 5 c.c. corrected for solubility in the brine.	Percentage by weight found by nitrometer.
5 per cent. . .	·922	68·5	4·74
10 " . .	·920	141·5	9·81
16 " . .	·917	225·6	15·69

All these solutions, when added to water, give off some of the nitrite of ethyl as a gas with effervescence. To test them it is therefore necessary to first dilute with a known bulk of spirit; in other words, to bring them all down to about $2\frac{1}{2}$ per cent., which appears to be the strongest solution which can be mixed with water without loss. The aqueous solution of this glycerol-alcoholic solution of nitrite has a very pleasant flavour, and reminds one of certain wines of the dry sherry type, such as Amontillado, or Vino de Pasto.

These solutions have only been made a few weeks, but have been tested several times, and appear to be as strong now as when first made, so I hope that we shall be able in future to make a

solution which will at any rate keep for a reasonable time without deterioration or loss of strength.

At the close of the paper, Mr. Williams showed the effect of adding water to solutions of different strengths. Effervescence caused by the escape of gaseous nitrite was observable in all the solutions containing more than $2\frac{1}{2}$ per cent., and in the case of the stronger solutions the effervescence was very brisk.

The PRESIDENT said the Conference had to thank Mr. Williams for this excellent paper, which was only one of a series, and he hoped they would have many more of the like kind from him.

Mr. A. H. ALLEN said he was delighted to find that Mr. Williams had succeeded in devising a preparation which bid fair to keep with all reasonable accuracy, and which would be probably of great advantage to pharmacists generally. He was much struck with the experiments Mr. Williams had shown, proving that the amount of gas which could be retained on dilution did not exceed $2\frac{1}{2}$ per cent. It was quite possible that the attempts some had made to make a strong solution of ethyl nitrite, and so obtain what they thought a very good preparation, had rather tended to defeat their own object. It seemed that the $2\frac{1}{2}$ per cent. contained in the B.P. preparation was amply strong enough, and if medical men could only be persuaded to prescribe so much of Mr. Williams's glycerine solution containing a certain amount of nitrous ether, as distinguished from so much spirit of nitrous ether, it would very much facilitate matters. In the first place the assay of it was easy; the pharmacist could easily satisfy himself it was correct. But Mr. Williams had now introduced a method by which even assay was unnecessary. He was also pleased to find that Mr. Williams had found that the means he (Mr. Allen) had suggested of assaying these preparations by means of the nitrometer was a useful one in practice. It was never pretended that it possessed great accuracy, but merely that it was a ready method of ascertaining with considerable approach to accuracy the strength of such preparations.

Mr. KEMP asked if the strong solution containing 16 per cent. was capable of easy dilution to the lower strength, because the more concentrated form would be more convenient for export.

Mr. WILLIAMS said the more concentrated preparation would travel better and keep better than the weaker; and it could be diluted with a mixture of glycerine and alcohol when required for

use. The proportion would be about 6 parts of the mixture to 1 of the solution, to bring it down to $2\frac{1}{2}$ per cent.

Mr. MACEWAN remarked that this preparation had nothing to do with the medicinal preparation, spirit of nitrous ether, and it occurred to him that it might possibly be dangerous, that nitroglycerine might be formed by deposition of the nitrate.

Mr. WILLIAMS said he had no wish at all to recommend this as a substitute for spirit of nitre; it was simply a question of the solution of nitrite of ethyl in a medium which would keep it.

Mr. MARTINDALE remarked that the aldehyde and paraldehyde which were formed probably contributed to the active properties of the preparation known as spirit of nitrous ether.

Mr. W. LASCELLES-SCOTT thought it a great pity that it should go forth that there was the slightest probability that nitrite of ethyl preserved by this process could or would form nitroglycerine. There was no evidence of that whatever, and what little evidence there was, was against it.

Mr. SCHACHT thought most pharmacists were in the habit of practising the very elegant method proposed by Mr. Allen for determining the strength of sweet spirit of nitre, but that test, excellent as it might be, and all other tests that he knew of, went mainly to show the quantity of the nitrous acid radical in the specimen, and in no way determined whether that radical was combined as an ether, or in any other form. He should like to ask if any one knew of any process which would show absolutely the quantity of nitrite of ethyl in any mixed sample. He was speaking of this subject in his own neighbourhood the other day, when giving a few instances of what he thought was a deficiency in their knowledge, and he was able to show the young men there assembled a little bottle of stuff which would answer all the B.P. tests—having exactly the right specific gravity, giving the right indication with litmus, precisely answered what was required with the ferrous sulphate test, and would give exactly the quantity of nitric oxide gas indicated by Mr. Allen's elegant process—and yet there was not a particle of ethyl nitrite in the preparation. This was a challenge to those young men to discover, if they could, a real chemical test for nitrite of ethyl, which, as far as he knew, had yet to be found.

Mr. ALLEN remarked, that as Mr. Williams had pointed out, any free nitrous acid was represented by the gas liberated before the sulphuric acid was added. Free acetic acid would have the same effect, for it would decompose the nitrite and produce free

nitrous acid. What was got afterwards on adding sulphuric acid to the tube was the nitrous radical existing in the form of nitrites, and it might fairly be assumed, in any preparation which was not cooked for the purpose of puzzling a student, that it existed in the form of ethereal nitrite. If you put in nitrite of potassium, there would be a solid residue left, which could be detected in various ways; but they were really not concerned with that in the actual examination of such preparations. On the other hand, if there were nitroglycerine present, that was a nitrate not a nitrite, and would not be decomposed with the given test in the nitrometer. On the other hand, nitrite of amyl would give off nitric oxide resulting from its decomposition in the nitrometer, in the same way as nitrite of ethyl.

Mr. ALCOCK said there were some eminent pharmacists who objected to calling glycerine a preservative, but here was a very good example, showing that it was of service as such, though of course it might not be equally useful for all things. He was of opinion that it is a preservative, and was pleased to find it so powerful in this case. Glycerine undoubtedly acted in this way when added to fluid preparations of pepsine.

Mr. WILLIAMS said he thought the idea of nitroglycerine being formed was rather a scare, and it would be well to wait until it was proved that it could be formed by such a process. With regard to Mr. Schacht's observations, it was quite true there was no test for nitrite of ethyl, but you must take things with their surroundings. You might make up a bogus preparation which would puzzle a student, but that was hardly a question within the scope of the Conference.

The Conference then adjourned for luncheon.

On resuming, a paper was read on—

THE BELLADONNA LINIMENT OF THE BRITISH PHARMACOPŒIA.

BY FRANCIS RANSOM.

Amongst the numerous criticisms which the additions and alterations of the new Pharmacopœia have evoked, occasional reference has been made to the change in the method of preparation of belladonna liniment.

The alteration has, as a rule, been regarded with favour, and the following experiments were commenced with the object of ascertaining whether such approval is deserved, and also whether the present process is the best that can be devised.

A liniment (*a*) was firstly prepared in exact accordance with the directions given in the 1885 Pharmacopœia, as follows:—

“Take of—

Belladonna Root in 40 powder	. . .	20 ounces.
Camphor	. . . . .	1 ounce.
Rectified Spirit, a sufficiency to make		30 fl. ounces.

Mix the belladonna with 20 fluid ounces of the spirit, and macerate in a closed vessel for three days, agitating occasionally; then transfer to a percolator, and when the liquor ceases to pass, continue the percolation with more of the spirit, allowing the liquor to drop into a receiver containing the camphor, until the product measures the quantity above stated.”

The alkaloidal value of the product was then ascertained by the following process, which was used throughout the succeeding experiments.

Fifty c.c. of the liniment are evaporated nearly to dryness over a water-bath with a gentle heat. The extract thus obtained is dissolved as far as possible in about 5 c.c. of warm distilled water, and filtered, the residue being washed with diluted hydrochloric acid until nothing further is removed, or until a drop of a solution of iodine and iodide of potassium added to a few drops of the washings in a watch glass ceases to give any precipitate. The filtrate is then rendered alkaline with ammonia, poured into a stoppered glass separator, and agitated for a few minutes with chloroform, which removes the alkaloid and any camphor that had remained in solution. The alkaline liquid is again washed with chloroform until no further alkaloid is removed.

The mixed chloroformic solutions are twice agitated with diluted hydrochloric acid, which removes the alkaloid, but leaves camphor and other impurities in solution. After separation, the acid liquid is rendered alkaline with excess of ammonia, and the alkaloid removed by agitation with two successive 5 c.c. of chloroform. The latter, allowed to evaporate spontaneously in a weighed dish leaves a light crystalline residue, which, when dried over a water-bath until constant, represents the amount of atropine and hyoscyamine in the 50 c.c., or, if doubled, the percentage by volume in the liniment examined.

This method of estimation is almost identical with that proposed by Professor Dunstan and myself for the assay of the alkaloids in the alcoholic root extract of belladonna, and used by us in our examination of commercial samples (*Pharmaceutical Journal*, March 13, 1886).

In the present case the liniment prepared in exact accordance with the official directions yielded an alkaloidal residue weighing $\cdot 137$ gram = $\cdot 274$ per cent. In order to obtain the 30 fluid ounces of final product required by the Pharmacopœia, 54 fluid ounces of rectified spirit had to be used in the process.

My attention was first directed to ascertain whether it be possible to prepare a liniment of equal strength with a less expenditure of time and alcohol than was here required. It is also desirable, if possible, that the official process for galenical preparations should be available for manufacturing purposes on a larger scale than indicated by the quantities given in the Pharmacopœia. It is generally found in processes involving percolation, that extreme fineness of the powder operated upon is a disadvantage in dealing with large quantities, although perfectly suitable when only one or two pounds of the substance are used. The heavier the weight of the column of material, the more liable it is to get blocked at the bottom of the percolator, if the powder be in a very fine state of division.

With these considerations in view, a liniment (*a'*) was prepared in the proportions directed by the Pharmacopœia, but with the following alterations in the process. The root was not so finely powdered, being passed through a sieve having twenty instead of forty meshes to the linear inch. Instead of continuing the percolation until 30 fluid ounces of percolate had passed through, the marc was subjected to pressure (in a small tincture press), when 40 fluid ounces of spirit had been used, this being found by experiment to be about the amount necessary to obtain the final 30 ounces required. By this modification a saving of 14 fluid ounces of rectified spirit was thus effected, and less labour was required in powdering the root. Fifty c.c. of this liniment were then estimated by the method already described, and the residue when dried weighed $\cdot 139$ gram = $\cdot 278$ per cent.

Two other liniments were prepared from an inferior root with similar results: (*b*) being prepared in exact accordance with the Pharmacopœia, and (*b'*) with the modifications already described. The following table shows the comparative results:—

(a)	.	.	·137	gram	=	·274	per cent. by volume.
(a')	.	.	·139	"	=	·278	" "
(b)	.	.	·0285	"	=	·057	" "
(b')	.	.	·032	"	=	·064	" "

From this it appears that a slightly better result is obtained by the modified process, and a considerable economy in alcohol is effected.

That pressure is of value in the alkaloidal extraction was further indicated by the fact that a liniment prepared from fifty pounds of root in still coarser powder, and employing hydraulic pressure, was found to be slightly stronger than that prepared from the same root by the official process.

Some experiments were next directed to ascertain whether the footnote in the new Pharmacopœia, stating that improved exhaustion requires the increased volume of spirit as compared with the 1867 Pharmacopœia (*i.e.*, 30 instead of 20 fluid ounces) is correct. Two liniments (*a''*) and (*c''*) were prepared according to the 1867 Pharmacopœia with results as indicated below, (*a*) and (*c*) being liniments prepared from the same roots according to the 1885 instructions.

(a)	.	.	·137	gram Alkaloid	=	·274	per cent.
(a'')	.	.	·1285	" "	=	·257	" "
(c)	.	.	·0535	" "	=	·107	" "
(c'')	.	.	·059	" "	=	·118	" "

It will be seen by the above that in one case the new liniment contains the larger percentage of alkaloid, while in the latter that prepared according to the old form is slightly the stronger. Practically I think we may say that the two liniments are about the same strength, much, however, depending upon the manufacturer's idea as to the meaning of a coarse powder.

The more explicit directions in the new Pharmacopœia as to the degree of disintegration to which various drugs shall be reduced before exhaustion, are undoubtedly an improvement, although it may be that in some cases a powder of unnecessary fineness is ordered.

The next point determined was the extent to which atropine and hyoscyamine are removed from the root by the present official process for the preparation of the liniment. Two samples of root were estimated by the method proposed by Professor Dunstan and myself in a paper on "The Assay of *Atropa Belladonna*" (*Pharm. Journ.*, February 9, 1884). The first specimen (*a*) consisted of

small foreign roots selected from a bale of fair appearance. The second (b) was mostly large English roots, derived from plants of several years' growth. The results obtained were as follows:—

(a)	.	.	.	.	.	·58	per cent. Alkaloid.
(b)	.	.	.	.	.	·255	„ „

Liniments prepared from these by the official process contained respectively ·274 and ·107 per cent. alkaloid. As however, 30 fluid ounces of the final product represent only 20 ounces of the dried root, it was necessary to multiply these figures by $1\frac{1}{2}$ to indicate the proportion of alkaloid removed from the root. We then arrived at the following results:—

(a) $\cdot274 \times 1\cdot5 = \cdot411$ per cent. = 71 per cent. of the total atropine and hyoscyamine in root.

(b) $\cdot107 \times 1\cdot5 = \cdot161$ per cent. = 63 per cent. of the total atropine and hyoscyamine in root.

The above indicates, as might be expected, that the exhaustion is far from complete, and also that the root containing the larger percentage of alkaloid is further exhausted than the weaker.

The great difference in the alkaloidal value of the roots used, and consequently of the respective liniments prepared therefrom, induced me to continue the investigation somewhat further than originally intended.

The fact that the young roots are much richer in atropine than those of older growth was first pointed out by Lefort in 1872 (*Journ. de Pharm.*, xv. pp. 265 and 337). The percentages recorded by him, and also by Dragendorff, some years later, vary from ·21 to ·6 per cent., and my own experience tends to corroborate the conclusion arrived at by the former chemist, that the proportion of atropine in the root of *Atropa Belladonna* is extremely variable.

Such being the case, some means should, if possible, be taken to ensure some degree of uniformity in the strength of a preparation of so much importance and in such constant use as belladonna liniment, for it has already been shown that it is liable to at least as much, and possibly more variation than the root itself.

It was suggested by Umney in 1875 (*Pharm. Journ.* [3], v. 281) that the liniment should be prepared from a fixed amount of the alcoholic extract of the root.

From recent investigations (*Pharm. Journ.*, March 13, 1886), it has, however, been shown that this extract, as met with in commerce, is far from uniform in strength, the specimens examined

containing from 1.65 to 4.45 per cent. of atropine and hyoscyamine.

In describing the root to be used for all official preparations, the Pharmacopœia states that it is "from one to two feet long, and from half an inch to two or more inches thick." The length here given probably refers to the fresh unbroken root, as when dried it is generally met with in much shorter pieces. By selecting belladonna of this description, roots of almost any age would be included, excepting the smallest, which are generally the youngest, and, as has been shown, the richest in atropine. Probably the only way of insuring an article at all constant in strength would be the introduction of a standardized preparation. If the extract were thus standardized, Umney's suggestion could be advantageously carried out, and a liniment prepared from a definite weight of extract would always contain a known percentage of atropine and hyoscyamine. A judicious selection of roots would then be necessary, and probably some of the rubbish now occasionally met with would have to be discarded. A process for the preparation of such an extract could easily be devised, and would be quite as workable and reliable as that already employed for the extract of *nux vomica*.

In order to ascertain the average strength of the present liniment as met with in commerce, I assayed the following samples obtained from various sources :—

(1)	·255	gram atropine and hyoscyamine in 100 c.c. liniment.
(2)	·067	" " " in 100 c.c. "
(3)	·152	" " " in 100 c.c. "
(4)	·224	" " " in 100 c.c. "
(5)	·158	" " " in 100 c.c. "
(6)	·274	" " " in 100 c.c. "

Of these, Nos. 1 and 4 were made with methylated spirit, and Nos. 5 and 6 were specimens already prepared by myself in strict accordance with the Pharmacopœia, and working upon 20 ounces of root, the amount therein stated.

From these results it appears that .2 per cent. is about the average strength, but it might be well to examine more samples before fixing a strength for a standardized preparation.

The fluorescence due to chrysotropic acid was more or less evident in the alkaline solutions obtained during the estimations, and was especially noticeable in those preparations which proved to be richest in atropine and hyoscyamine.

The average strength of the alcoholic extract, as indicated by the investigations already referred to, is 2.9 per cent. If the strength of the extract could be relied on as constant, say 3 per cent., the formula for preparing the liniment would then be as simple as that already introduced for the preparation of tincture of *nux vomica*.

The time is probably not far distant when various official preparations will be directed to be standardized, besides those already so ordered.

Although the results recently published by W. F. Southall, on his examination of commercial liquid extract of cinchona, are not encouraging, we may reasonably hope that the advantage of using preparations of known strength will soon become more fully recognised, and if insisted upon, the care and experience necessary on the part of chemists for their production will doubtless be forthcoming.

The PRESIDENT having moved a vote of thanks to Mr. Ransom,—

Mr. MOSS said he could confirm Mr. Ransom's experiences with regard to percolation. When working on a small scale, No. 20 powder might be used with a satisfactory result, but if the bulk of the material were increased, so that the percolator contained a large quantity of the ground root, the powder must be somewhat coarser. There was all the more reason for this, because the intentions of the Pharmacopœia were not always perhaps strictly carried out by drug grinders. A No. 40 powder, as he understood it, would pass through a 40 sieve, but would not give much powder which would pass through a smaller sieve. In grinding these roots, an absolutely uniform powder could not be produced, and a 20 powder would contain some which would go through a finer sieve even than a 40, or perhaps a 60, and in percolating with large quantities, probably the finer particles in the upper part of the percolator got washed down into the lower part, and so choked it up. For that reason it was necessary to use a coarser powder when working with large quantities.

Mr. UMNEY said pharmacists had to thank Mr. Ransom and Mr. Dunstan for many experiments in the direction of standardizing drugs, and the time had now come when the alcoholic extract of belladonna root should be standardized, so as to get over some of the difficulties to which he had alluded. He found the extract variable; this no doubt arose in great measure from imperfect

percolation on the one hand, and from variations in the root on the other. The younger root, as he gathered, yielded more alkaloid than the older. He must say he had overlooked the experiments by a French chemist to which Mr. Ransom had referred. He could quite corroborate the statement that drug grinders had not quite followed the instructions of the Pharmacopœia as to the production of No. 20 or No. 40 powder. Some time ago, at Professor Redwood's request, he sent him a complete set of powders, and had quite a smart controversy with him on the subject, but was obliged to give in at last, for the professor pointed to three or four words in the Pharmacopœia which were unmistakable. When grinding a powder to pass a 40 mesh sieve, it was not intended that there should be a large quantity of smaller sized powder in it, but these powders were not very easy to prepare. In crushing roots like belladonna by millstones, a large quantity of very fine powder was produced. Professor Redwood said that such ought to be removed, but the question arose what was to be done with it if it could not be used up in some form or other.

Dr. SYMES pointed out that this differentiation of the size of powder, although very desirable in one view, might prove a source of error. It was well known that in taking either a root or stem a certain portion, either the medullary or cortical portion, would powder more freely and form a finer powder than the other; to sift out the finer powder might simply separate the starchy matter, and so increase the strength of the residue; or on the other hand the strength might be diminished. In the case of ipecacuanha, he should think the effect of rejecting the coarser portion would be to increase the strength considerably, because the active portion would grind the finest. In his view the indications of the Pharmacopœia should only be followed in minute detail when they commended themselves to common sense.

Mr. UMNEY remarked that this was the line of argument which he followed with Professor Redwood.

Mr. KEMP suggested that the difficulty arising from having a large quantity of powder in the percolator, might be got over by introducing a few layers of filtering paper, so as to prevent the finer portions of powder being carried down by the menstruum.

Mr. H. W. JONES thought it had been undoubtedly shown that it was not right to take the coarser portion of the powder only, but to grind up a definite amount of root, and take it as it was. On the manufacturing scale it was not always an advantage to proceed very quickly.

Mr. HOLMES said one point came out very clearly from this paper, viz., that the results obtained in working with small quantities were very different to those obtained on a large scale; it would be necessary, therefore, in compiling a future Pharmacopœia, that practical pharmacists engaged in wholesale as well as in retail business should be consulted.

The PRESIDENT remarked, that in using a mortar the cortical portion of ipecacuanha root was reduced to a powder with very little exertion, but to powder the medullary portion required very great labour. He could quite understand that if the medullary portion were rejected a much stronger preparation would be the result. This paper brought to the front two very important points: one regarding the sieves, and the other the percolation; and the question was, whether the substance to be percolated should be in a fine powder, or rather coarse. There was much to be said on either side, but there was one point he should like to have explained by Mr. Ransom or Mr. Umney. He could not understand why, in making belladonna liniment, the root should be prescribed in the Pharmacopœia, when it had been determined beyond question that the leaves contained a larger proportion of the alkaloid than the root.

Mr. RANSOM said he should imagine the alkaloid was almost as variable in the leaf as in the root; the liniment would be a very different preparation made from the leaf, and it would be rather awkward to alter it. With regard to standardizing preparations, there could be no doubt that greater uniformity should be obtained than was yet arrived at in many of these things, and it seemed to him that preparations of belladonna might be more usefully and easily standardized than many others. There were two alkaloids, atropine and hyoscyamine; the atropine was always much in excess, and the atropine of commerce probably always contained hyoscyamine.

The next paper read was on—

SALOL, A NEW ANTISEPTIC.

By JOHN MOSS, F.I.C., F.C.S.

A few notes on a new antiseptic of promise will no doubt interest the members of the Conference.

Our information on salol is derived chiefly from *La Semaine*

Médicale, April 14, 1886, which reports a meeting of the Medico-Pharmaceutical District Society of Berne, held in that city on the sixth of the same month. M. Sahli introduced salol as a new antirheumatic and antiseptic produced by Professor von Nencki, and as possessing certain very decided advantages over other bodies having allied therapeutic characters.

It is perhaps hardly correct to speak of salol as a new antiseptic. It is rather an association, a combination indeed, in which are concerned two well-known antiseptics, salicylic acid and phenol. It is somewhat startling to be told that phenol is an ether which is playing the rôle of a base, and that the compound is salicylate of phenol. We should be disposed to assume that M. Sahli's remarks on these points are misreported, and that salicylate of phenyl was intended, were it not that the word salol is evidently compounded of the initial and terminal letters of the former title.

Salol is a white crystalline coarse powder, rather like damp table salt. The odour is very marked, and is identical with that of oil of wintergreen, which is chiefly salicylate of methyl ($\text{C H}_3 \text{ C}_7 \text{ H}_5 \text{ O}_3$). When taken into the mouth, a fainter impression of the smell is received on the palate, and the taste of carbolic acid is just suggested. It is very sparingly, if at all soluble in water at 60°F . It dissolves in proof spirit, more readily in stronger spirit, and is precipitated on dilution, a permanent emulsion being formed. The solution has no effect whatever on litmus.

Salol melts at 106° to 108°F ., forming at a slightly higher temperature a clear white liquid like carbolic acid. If it be melted under water and shaken till cool, the original condition of a coarse crystalline powder is restored.

It dissolves readily in caustic soda solution, and on addition of acid in excess the liquid becomes milky, oily looking drops are visible, and the smell of carbolic acid is noticeable. When the liquid is only slightly acid, the addition of a nearly neutral solution of ferric chloride produces the purple coloration indicative of salicylic acid.

The advantages which are claimed for salol over salicylate of soda, for which it is proposed as a substitute, are dependent first of all on its insolubility in water and the juices of the stomach, and secondly on the ease and completeness with which it is decomposed after passing the pylorus. Being insoluble in water, it is free from the repellant and nauseating effects of salicylate of soda, which some patients find so objectionable that even syncope has sometimes supervened on ingestion. Passing through the

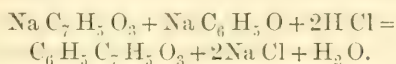
stomach unaltered, it undergoes decomposition in the duodenum, where it comes into contact with the pancreatic juice and is broken up into salicylic acid and phenol. Professor von Nencki claims that this change is due to the pancreatic ferment, but a simple experiment suffices to show that so highly organic a secretion is not essential to produce the effect referred to. The pancreatic juice is alkaline in character, and I find that the addition of a few drops of solution of soda brings about the decomposition, so that the further addition of ferric chloride is followed by the characteristic purple coloration. The action of the soda takes place very slowly in the cold, more quickly when gently warmed. The liquid must be neutral or slightly acid for the colour to be produced, though much acid discharges it. The best effect is obtained by digesting salol in solution of soda at 100° F. for an hour, pouring off the clear liquid, adding slight excess of hydrochloric acid, and diluting, then adding a dilute solution of ferric chloride. No coloration whatever results when salol is heated with an acid instead of alkali previous to the addition of ferric chloride.

Now the salivary secretion also is alkaline, and if alkali is the only essential factor in the analysis of salol, it ought to happen that digestion with saliva should lead to the purple coloration with ferric chloride under the conditions already laid down, and this in fact is what occurs. The saliva is so slightly alkaline, however, that the amount of salol decomposed is correspondingly minute and the coloration very faint. The weak taste of salol is therefore accounted for.

Having passed the duodenum, the salicylate and phenate of alkali, which are slowly produced as the gut is followed, are in condition to exercise their respective antiseptic powers, and to be absorbed into the circulation. They are voided as urate of salicyl and as sulphophenol.

So far as I know, the process of manufacture of salol has not been made public. I have tried to produce it by dissolving salicylic acid in excess of carbolic acid with the aid of a gentle heat, but have not succeeded in getting the whole of the salicylic acid so combined as not to give the purple coloration at once with ferric chloride. It seems not improbable that it should be formed by treating with hydrochloric acid at an earlier stage in the manufacture of salicylic acid. As you know, when the carbonic acid gas is brought into the presence of carbolate of sodium in the retort, a molecule of the former is absorbed with production of a molecule of salicylate of sodium, and a molecule of carbolic acid,

which distils away. If the mixed salicylate of sodium and carbolic acid, or, better, carbolate of sodium, be treated with hydrochloric acid, the following equation would probably represent the decomposition:—



Chemically speaking, salol is salicylate of phenyl. The possibility that it is phenylsalicylic acid, of which the formula would be $\text{HC}_7\text{H}_4(\text{C}_6\text{H}_5)\text{O}_3$, is contra-indicated by its indifference to litmus, though the latter view receives support from the slow rate at which the compound is decomposed by soda, as well as from the observation that after the decomposition is effected, the addition of hydrochloric acid, under ordinary conditions, is not followed by the reformation of the original compound. I am aware that the latter fact apparently disposes of the suggestion just made as to the manufacture of salol; but it must be borne in mind that the effects of high temperature and pressure on two bodies set free in presence of each other cannot be disregarded.

Salicylate of phenyl contains 36 per cent. of phenyl, corresponding to 44 per cent. of carbolic acid. Sahli says that salol contains not less than 38 per cent. of phenol; but seeing that his account did not concern itself chiefly with the chemistry of this new compound, a little latitude of expression is admissible.

Sahli claims that more carbolic acid may be ingested as salol without unpleasant secondary effects than in any other way. The dosage of salol being 30 grains three or four times a day, 12 grains of phenol are exhibited in every dose, and the freedom from irritation and other unpleasant local effects may be attributed to the slow rate at which salol is decomposed under the action of the intestinal juices.

For the present it remains only to state what are the various ailments in which Sahli has used salol with good effects. He has used it in all rheumatic affections, in chronic urticaria, in sub-orbital neuralgia, as an antipyretic, in diabetes, in intestinal catarrh, in typhoid fever, in cholera, against intestinal parasites, in catarrh of the bladder, in ozæna, in otorrhœa, as a local application in gonorrhœa, and as a mouth wash.

Since the above was written, I have learned from Messrs. Kühn & Co., who represent the manufacturers in this country, that the latter, Messrs. Durand & Huguenin, are not in a position to state

how salol is made. The probability is that the process is entirely secret, and not the subject of a patent.

The PRESIDENT, in proposing a vote of thanks to Mr. Moss, remarked that this paper brought before the Conference a new substance which might by-and-by be of importance in medicine. He recollected, not many years ago, when Mr. Daniel Hanbury in the same way brought under the notice of the members of the Conference, for the first time, chloral hydrate, which had since obtained a very extensive use.

Mr. LASCELLES-SCOTT said this very interesting paper required more time for discussion than could be afforded it. Mr. Moss had given the percentage of carbolic acid, or the carbol radical present, but it might be interesting to state that, from some hasty experiments he had made with a small sample of salol on hay infusion and milk, he found that its antiseptic power in preventing decomposition and sterilizing bacteria was slightly in excess of that of carbolic acid itself.

Mr. NAYLOR said he did not gather that Mr. Moss had himself determined the percentage of carbolic acid which this salicylate of phenol was capable of yielding. He should like to know if he had tested it for salicylate of methyl, as it had distinctly that smell.

Professor ARMSTRONG said the most recent method employed in the manufacture of salicylic acid did not involve the production of any free phenol. The production of free phenol was due to an action which took place between the sodium salicylate which was first formed and the phenate, whereby a basic salicylate was formed. Schmitt had shown that it was only necessary to saturate the dry sodium phenate with dry carbonic anhydride at the ordinary temperature, and to heat under pressure to a temperature of 120° C. the phenyl sodium carbonate thus formed, to effect its conversion into sodium salicylate. Commercial salicylic acid was now made under that patent, he believed.

Mr. Moss said, in reply to Mr. Naylor's question, that he did not pretend to have made any quantitative examination of this body. It was brought under his notice, and feeling extremely interested in it, he had referred to the original papers; in transcribing them for his own purposes, it occurred to him that an account of it might be interesting to the Conference. He assumed that salol was a chemical compound, because he did not find either free salicylic

acid or free carbolic acid in it. What he particularly wished to draw attention to was his observation that alkali would decompose salol. He was much obliged to Professor Armstrong for the information he had given as to the *rationale* of the decomposition in the process for making salicylic acid; he must at once admit that he was not previously aware of it, and of course any speculation based on erroneous knowledge fell to the ground.

The following papers were then read and discussed together :—

NOTE ON THE "PURE TERE BENES" OF COMMERCE.

By W. LASCELLES-SCOTT, F.R.M.S.

The generality of pharmaceutical preparations are known and ordered by their technical or vernacular names, with or without the addition of a qualifying adjective, according to the particular uses for which they are required. In the case of the hydrocarbide to which, in its commercial forms, I desire to direct your attention to-day for a few minutes, this rule scarcely applies, since by way of avoiding confusion with a dark-brown fluid of doubtful composition, which has of late been put forward as a disinfectant, under the title of "terebene," the term "pure terebene" seems to have been tacitly, if not officially, adopted for it.

This is somewhat misleading, and, so far as my experiments go, the name is scarcely more appropriate than "pure cyanide" would be if this were taken as the term by which all the cake cyanide of potassium used in this country was known. However, the name, like many other things, good, bad and indifferent, seems inclined to stick; so we must accept it as it stands, at least until we know a little more about its integral constitution.

Terebene, to leave out for once its unwarranted prefix, is, as we all know, prepared by treating rectified oil of turpentine with various substances which cause it to undergo certain molecular changes without themselves suffering alteration. These substances are generally members of that class which possesses a great attraction for water, such, for instance, as concentrated sulphuric acid, chloride of zinc, fluoride of boron, glacial phosphoric acid, and even chloride of calcium in the form of a thick, syrupy solution. Of these the most effective are fluoride of boron, and sulphuric acid, and either of them would give satisfactory results provided that the oil of turpentine is itself pure, and that due time is al-

lowed for the operation. The usual plan is to mix the oil with 5 per cent. of its weight of concentrated sulphuric acid, repeating this operation once or oftener, until the distillate from such mixture no longer rotates a polarized ray of light either to the left or right, and becomes, in fact, optically inactive.

There is certainly no great difficulty in performing an operation of this extremely simple character, and it might fairly be imagined that the terebenes commonly sold would be to all intents and purposes of uniform quality and therapeutical value. Some cases published in the *Lancet* a little while back appeared to indicate, however, that the terebenes of commerce were not of uniform quality, and that they, or some of them, were liable to induce or aggravate various skin affections. In one instance which came under my notice, terebene had been given internally for some time with impunity, but an extremely irritable millitary eruption showed itself, until another brand was substituted. When the terebene was discontinued the eruption gradually died away, reappearing in forty-eight hours when the same terebene was again administered. It was then thought desirable to examine several of these preparations, and endeavour to find out the reason why some produce skin diseases and others do not.

I may here record my opinion that it is not too really pure, freshly prepared terebene that these effects were due; they were probably occasioned by one or other of the foreign bodies contained therein.

A number of samples of terebene were then examined, and the chief results are given in the following table. Peroxide of hydrogen was the ingredient respecting which my suspicions were chiefly excited, as I had been informed of two cases in which this preparation had been administered where it had occasioned very similar symptoms. With but few exceptions all the terebenes examined were impure, as shown by their leaving a resinous layer on evaporation, and by the fact of their whitening the corks of the bottles containing them. Some also contained much unchanged turpentine, and these samples were of course not "optically inactive." Iodide of potassium and starch, applied in the form of "Schonbein's ozone paper," is useful in detecting H_2O_2 , and oxide of silver is very readily reduced by many of these "pure terebenes," the disengaged oxygen rising almost in effervescence from the fluid.

The great practical value of terebene for internal use in the ordinary way, and as an inhalant, renders it in my opinion the more regrettable that the majority of specimens seem to be impure,

but the time is approaching when medical men will demand a much better and more definite preparation than is now, in most cases, available for them. It is therefore in the hope that the expression of some opinion hereon by this meeting of the Conference may tend a little towards a more carefully prepared article, that I have troubled you with these few observations.

The samples in question are as under, the amount of peroxide of hydrogen present being expressed, as usual, in volumes of oxygen liberated :—

	Resin per cent.	Vols. of O.	Remarks.
1* . .	—	1·13	
2 . .	—	—	Fairly good sample.
3 . .	·08	·86	
4* . .	·71	1·72	Turpentine odour.
5* . .	·26	·37	
6 . .	—	—	Good sample.
7 . .	—	·39	
8* . .	·21	1·90	Turpentine odour.
9* . .	2·10	1·85	Caused continuous eruption when taken internally.
10 . .	trace	—	
11 . .	·64	·88	
12* . .	1·75	2·84	Very "turpentiney."
13 . .	1·04	—	
14 . .	·31	1·07	
15 . .	—	0·85	

Samples marked thus * exerted considerable influence upon the polarimeter, and hence were by no means "optically inactive."

I am convinced that it is impossible to prevent *all* tendency to the absorption of H_2O_2 by terebene, however carefully it may be made; but I may perhaps remark, in conclusion, that a very dry atmosphere, such as can be obtained by the use of a chloride of calcium tube, or a few lumps of caustic lime, will reduce this to a minimum. A little oxide of silver in a cambric bag suspended in the terebene, also enables it to be kept for a long time practically unchanged.

In the absence of Mr. J. Hodgkin, F.L.S., etc., the following paper was read by Dr. Thresh :—

SHORT NOTE ON THE IMPURITY OF "PURE TERE-BENE," AS INDICATED BY THE POLARIMETER.

BY JOHN HODGKIN, F.L.S., F.I.C., F.C.S.

In view of the announcement of a note on the Pure Terebenes of Commerce, by Mr. W. Lascelles-Scott, the following statistics of the optical examination of various samples that have come under my notice may possibly prove of interest, and at the same time perhaps confirm to some slight extent the accuracy of Dr. Bond's deduction, in his letter on terebene (*Brit. Med. Journ.*, p. 617, March, 1886), "that it is very doubtful whether there is any such substance at all as 'pure terebene.'"

The samples examined consisted of seven British, representing six makers, C and D being different deliveries of the same manufacture; one of which the origin is doubtful, H (probably foreign); and two foreign samples, I and J. Before examining these statistics, it may be well to call to mind that pure terebene is stated to be optically inactive, and that the average polarimetric rotation of American turpentine (from which in all probability these were prepared, since the rotation of all is to the right) is $+18^{\circ} 6'$. Of course it is not possible to give the rotation of the various parcels of turpentine employed in the manufacture of these terebenes, but taking the $18^{\circ} 6'$ as the standard, I have worked out the percentage of unaltered turpentine of this rotation, in order that the varying values may be seen at a glance. The range of unaltered, *i.e.*, active, material still existing in the finished article is wide, from 3.2 per cent. to 61.0 per cent.

I may mention as a proof of the possibility of working commercially to a high standard, that eighteen batches of terebene made at our works at Stratford gave an average rotation of $0^{\circ} 29'$, or a percentage of 2.7 for unaltered material. Sample D indicates that a pleasant smell is no indication of the purity of the terebene. Whilst on the other hand H, smelling slightly of turpentine, has a good polarimetric test. The whitest samples were G and J, which contain the largest amount of unaltered material.

All of these samples were labelled "Pure Terebene," but in face of the rotations here indicated, and the optical inactivity of *really pure* terebene, it would in my opinion be rather difficult for any of them, excepting H, and possibly A, to maintain their position as

"pure." The presence of so large quantities of unaltered material is referable to imperfect manufacture rather than to deliberate adulteration.

Pure terebene should, according to these indications, be almost if not quite colourless, of low rotation, and at the same time of agreeable odour. This latter may vary slightly according to the turpentine employed.

Origin.	Sample.	Colour.	Smell.	Rotation.	Percent. unaltered.
British.	A	White	Fairly pleasant.	1° 5'	5.9
"	B	Yellowish . . .	Strong odour .	2° 58'	16.3
"	C	Slightly coloured	Fairly pleasant.	3° 42'	20.4
"	D	" "	Pleasant . . .	5° 58'	32.9
"	E	Nearly white . .	Pungent and un- pleasant . .	7° 6'	39.2
"	F	Slightly yellow .	Smells distinctly of turpentine .	10° 7'	55.3
"	G	White	Trace of odour of turpentine .	11° 3'	61.0
Doubtful	H	Slight colour . .	Slight smell of turpentine .	0° 35'	3.2
Foreign.	I	Yellowish . . .	Artificially scented . .	1° 44'	9.5
"	J	White	Strong of tur- pentine . .	10° 25'	55.8

A vote of thanks having been passed to the authors of these papers,—

Mr. Moss said he was glad these papers had been contributed, for he felt that a Conference held in Birmingham would have been incomplete without some reference to terebene, seeing how they were indebted to two gentlemen now present, Professor Tilden and Dr. Armstrong, the former of whom was Chemistry Professor in that institution, for almost all their chemical knowledge of this substance. They had made a minute examination of terebene, and showed how pure terebene could be manufactured, and as a maker of it, he felt bound to acknowledge his obligations to them. Like Mr. Hodgkin, he found the product varied somewhat, but whether the variation was caused by some unconscious difference in manipulation, or in the origin of the turpentine, he had not made out. He had always supposed that he was working on turpentine of the same character, but he noticed in the last lot he made, working on about 12 gallons, that he obtained a considerable quantity—an

ounce or two—of solid crystalline matter, which he carefully collected and put aside, which he supposed to be camphene, but had not yet been able to make any determinations.

PROFESSOR TILDEN said it was quite true, as Mr. Moss had said, that Dr. Armstrong and he had given a good deal of attention to terebene, but he was not aware that they had given the information Mr. Moss mentioned, for if one result came out more certainly than another, it was that there was no such thing as terebene at all, and therefore any process for the production of pure terebene could hardly have resulted from their investigations. The point of their research was to establish the fact that the substance termed terebene by the French chemist Riban was a mixture of at least three or four distinct hydrocarbons, and further, that the proportion of these hydrocarbons varied considerably, according to the manner in which the process of making terebene was carried out. He should like to hear from some manufacturer how he proceeded. In their experiments they employed almost exclusively strong sulphuric acid as the agent for effecting the molecular change, but in one respect their mode of procedure differed from that of M. Riban, who, if he remembered rightly, treated the hydrocarbon with small successive doses of sulphuric acid, until on examining it with the polarimeter it was found to be optically inactive, and then in accordance with the process previously described by Deville, distilled the whole, sulphuric acid and all. Since their paper was read, some six or seven years ago, an article had appeared by M. Riban himself, in which he endeavoured to controvert their statements. At present they had not had an opportunity of going over the ground again, but the only difference apparently which M. Riban could point out, was that he distilled the acid with the hydrocarbon after optical inactivity was established, and they did not. Anyhow, from the pharmaceutical point of view, the most important question to settle was to what did terebene owe its special therapeutical properties. Inasmuch as it was a mixture of things, the natural course would seem to be to take the several constituents which could be isolated, terepene, camphene, cymene, and other hydrocarbons known to be present, and examine their therapeutic effects separately. It was useless to talk about pure and impure terebene, until they knew more about it. Probably its medicinal activity would depend very much on the proportions of the various hydrocarbons. Perhaps Mr. Moss would kindly say whether he separated the hydrocarbons from the acid before distillation, because that would no doubt seriously affect the result. Mr. Moss

had referred to the production of a crystalline substance in the later stages of distillation, and he had separated a similar substance, which he had examined and shown to be a variety of Borneo camphor, only differing from the natural substance in being optically inactive.

Mr. Moss said the pure terebene of which he spoke was not the pure terebene of the scientific chemist, but a form such as was introduced early in the year by a well-known therapist, which generally possessed the following characters. It boiled at about 155° to 160° , was colourless, had rather a pleasant fruity smell, and was optically inactive. That was what pharmacists called pure terebene, and which Professor Tilden and Dr. Armstrong had taught him to prepare. He had followed the process they described with very little alteration, and he rather took credit to himself for having picked out the process from their paper, because as Professor Tilden had already said, one of the chief points they sought to determine was that there was no such thing as terebene. He took turpentine, and added to it in five successive quantities the proportion they mentioned, 5 per cent. oil of vitriol, and allowed the mixture to cool down. He then let it stand two or three days, carefully poured off the hydrocarbon from the magma, the thick tarry stuff which fell to the bottom of the vessel, neutralized it with carbonate of soda, and then distilled with steam. That was a most important point. He got over as much as he could in that way, redistilled it, and treated it again in precisely the same way, until he got an optically inactive preparation having the characters he had described.

Dr. SYMES thought the word *pure* terebene was intended to distinguish the article from a very impure terebene. Before it was used internally it was known as the subject of a patent, and was a very impure substance. When it was introduced medicinally, the question arose whether it could be used, because it was covered by a patent, and in the result the information was given that it was not the impure, disinfecting terebene, but *pure* terebene, which was to be used, and that was how the name became current. He found, after examining several samples, that the odour varied very considerably; that which came from Germany, for example, was frequently sweeter than that made in England. It had occurred to him whether or not the result of treating French turpentine, which was levogyrate, and American turpentine, which was dextrogyrate, would be the same in regard to the molecular changes brought about.

Mr. MARTINDALE said he believed he was the first to call this substance *pure terebene*, and published in the "Extra Pharmacopœia" some three years ago a short note upon it. He gave abstracts from the *British Medical Journal* in 1881-2, showing that in Germany it had been used medicinally as an expectorant. He applied the term to distinguish it from a substance known in English commerce, which was very impure. The preparation was clear and colourless, and was known as pure terebene, but of course it would vary, according to the time the acid was allowed to act on the hydrocarbons.

Mr. PASSMORE asked if Dr. Symes had ever seen a copy of a specification of a patent covering the manufacture of terebene.

Dr. SYMES said he had not seen the specification, nor had he gone at all into the question of its validity; but it was stated to be a patented article.

Mr. PASSMORE said he spent some time in the search, but had failed to find anything beyond a specification in which a substance described as being known to chemists as terebene was mentioned as one of the ingredients in a disinfectant that was the subject of the patent.

Mr. UMNEY thought some of the differences noticed in the terebenes of commerce might be attributed to the final heat used in the distillation. He had proceeded somewhat in the way mentioned by Mr. Moss, but had not used steam, and did not know how it could be done, unless superheated steam were used, or the distillation were carried on in the vapour of water.

Mr. MOSS said that Mr. Umney's remarks were made under a misconception; the steam distillation of which he spoke consisted in passing live steam through the mixture itself, he did not mean merely heating the still by steam.

Mr. A. H. ALLEN said there was one point on which he should like to hear Dr. Armstrong's opinion as an authority on American turpentine. Dr. Armstrong had shown that the optical activity of American turpentine varied from 16 down to 9; but it had been placed by the author of one of these papers at 18 and a fraction. If then it could vary from 18 to 9, it was quite clear that any estimation of the amount of the unaltered turpentine in a sample of terebene based on the optical activity would be liable to give an erroneous result, unless the activity of the turpentine used were first ascertained. With regard to the name terebene, it was first of all a name given to the product by the French chemist, Riban—who believed it to be a chemical individual, but the re-

searches of Professors Tilden and Armstrong had since shown it to be a mixture of several distinct substances. They were perfectly justified in speaking of it as terebene, and defining it as an inactive liquid produced by the action of strong sulphuric acid, or a similar reagent, on turpentine oil. As long as the product was optically inactive, and had the other characters associated with what had been termed terebene, it had a right to the name.

Dr. ARMSTRONG said it was quite true there were the differences in the optical properties of American turpentine Mr. Allen had mentioned, but the variations noticed were chiefly between samples shipped from the Savannah district on the one hand, and on the other from Wilmington: and inasmuch as the Savannah turpentine was a comparatively small quantity, the ordinary American turpentine of commerce might be said to be fairly uniform,—much more so than might be supposed from the figures referred to. If such a substance as pure terebene did not exist, the name remained for use as applied to the mixture which had been spoken of. On the other hand the danger arose, and it was a serious danger with regard to these preparations, that directly you used a homogeneous name of that kind, you began at once to think you were dealing with a uniform substance.

Dr. MEYMOTT TIDY said he had several times attempted to ascertain the action of pure terebene, and found no action at all; but the impure did seem to have a very definite action; so that medicinally it might be advisable to use the impure terebene, and not the pure one.

Mr. LASCELLES-SCOTT said he himself found some of the camphene which had been described; he handed a portion of the crystalline substance to a medical friend, who reported it as valueless, and he therefore took no further interest in it. He had cut out of his paper all reference to polarimetric results on seeing the title of Mr. Hodgkin's, but he might say that he had found all turpentines so variable in that respect that he could deduce nothing like a rule depending on this property.

The following papers were then read and discussed together:—

NOTES ON THE ESTIMATION OF EMETINE.

BY HENRY WILLIAMS JONES, F.C.S.

In examining ipecacuanha we have the advantage of an excellent method recently suggested by Professor Flückiger; but with liquid

preparations of the drug we have to work under less favourable circumstances. Emetine is generally regarded as easily suffering partial decomposition, as evidenced by the change in colour which occurs when it is exposed to light and air. Yet, for the purpose of examining preparations containing, like ipecacuanha wine, only a small amount of alkaloid, it is necessary to evaporate a considerable quantity of liquid—200 c.c. or more.

The following notes include a short description of experiments made with a view of determining how far alteration of the alkaloid takes place under certain conditions, and such as would be met with in the analysis of liquid preparations.

Since the publication of Professor Flückiger's process I have examined a number of samples of ipecacuanha by that method. It appears to give complete exhaustion of the root, and the alkaloid is obtained in an unaltered condition. In all samples I have examined I have found the residue from the chloroformic solution imperfectly soluble in acidulated water; and in one case the total chloroformic residue from a commercial powder, in which oil may have been used in grinding, amounted to over 6 per cent. The process consists in exhausting the drug, in the state of a fine powder, in a Soxhlet's tube, or similar apparatus, with chloroform and a small amount of ammonia.

I prefer treating the residue from the chloroformic solution with water and dilute sulphuric acid; filtering through cotton-wool, and recovering the alkaloid by means of chloroform and ammonia. It does not appear necessary to wash the acid solution with chloroform, as only a very small amount is removed. For example, an acid solution, equivalent to 10 grams of root, yielded, when treated in a separating funnel with chloroform, a dry residue weighing 5 milligrams, equivalent to 0.05 per cent. This shows, as will be more fully stated further on, that the chloroformic solution of the Flückiger process contains the alkaloid in a practically unaltered state.

Before the publication of the method just alluded to, I made, by means of the lime process, a considerable number of assays; and as a result of comparative experiments found the best mode of procedure to consist in treating the finely powdered drug with one-fifth its weight of lime, and sufficient water to make the whole into a paste, allowing the same to dry spontaneously in a warm place. Then rubbing to a fine powder the dried mixture and exhausting it with rectified spirit; treating the residue of this, after evaporation, with water and dilute sulphuric acid, filtering from insoluble mat-

ter; and lastly, recovering the alkaloid by chloroform and ammonia, and weighing the same.

Drying the mixture of ipecacuanha, lime and water over the water-bath gives a horny mass, difficult to powder, and still more difficult to exhaust either with spirit or chloroform. Instead of treating the drug with lime directly, the powdered root may be macerated in water, acidulated with sulphuric acid, for twenty-four hours; and the solution so obtained treated with lime in excess, evaporated on the water-bath, and the dry residue treated as previously described. I have found, however, that lower results are obtained by this modification. I have always found it better to exhaust the lime residue with strong spirit in preference to chloroform, for I have noticed on several occasions, when a trial with chloroform has been made, and the powder packed in a small tube percolator, that, after the chloroform had passed through it in a colourless condition, spirit would still remove a further amount of matter soluble in chloroform, even when the marc was originally in a state of a very fine powder.

Comparing the lime method as carried out by allowing the mixture of drug, lime and water to evaporate spontaneously, I have obtained results practically identical with those obtained by Flückiger's process. The latter method is, however, much easier to carry out, and therefore to be recommended in preference to the other.

The volumetric estimation of emetine by Mayer's solution has received a large amount of attention. And the standard solution has generally been added directly to the liquid obtained by macerating the root in water or alcohol acidulated with sulphuric acid, the alcohol being driven off before titration. We have here two causes at work likely to affect the result; the one being the presence, in solution, of substances other than emetine, and the other the varying amount of alkaloid in the liquid. This latter point has been frequently disregarded, and beyond the statement that one part of the alkaloid should be contained in 250 to 500 parts, I am not aware that anything has been published. To note the difference observable in solutions of various strengths, I prepared a pure specimen of emetine. This was obtained by precipitating, by sodic carbonate, a solution of hydrochlorate of the alkaloid, which, before being dissolved, appeared as a white solid, and in crystalline tufts. The air-dried alkaloid contained 6.71 per cent. of water.

The following table shows the results obtained by Mayer's

reagent (1 c.c. = .0189 gram emetine) during six experiments with the pure alkaloid :—

No.	Anhydrous Emetine taken.	Volume of Solution.	Amount of Mayer's Solution required.	Emetine indicated.
1	0.1421 gram.	10 c.c.	6.2 c.c.	0.1171
2	0.1421 "	30 "	6.4 "	0.1209
3	0.1421 "	50 "	7.0 "	0.1323
4	0.0945 "	10 "	4.2 "	0.0793
5	0.0945 "	50 "	5.0 "	0.0945
6	0.0945 "	100 "	5.4 "	0.1020

All solutions contained the same proportion of free acid.

With faintly acid solutions, I found that pure emetine, prepared as described, required to be present in the proportion of 1 to 530, to give exact results. Although a certain degree of dilution is necessary to insure the correct amount being found, the volumetric estimation of pure emetine in solution is not attended with such discrepancies as occur with some other alkaloids; and I believe that for practical purposes, and in cases where the solution has been freed from extraneous matter as far as possible, it may be assumed that the error due to concentration or dilution increases or decreases in a regular order. Instead of disregarding the difference due to volume, or of diluting to a given quantity, after making a trial to determine the approximate amount present, we may, I think, make use of a table of corrections, such as the following one, which is based on a number of actual determinations. The table gives a range from 1:50 to 1:500, and the nearer the solution approaches the latter in strength, the better. In determining volumetrically the emetine in the dry chloroformic residue obtained by Flückiger's process, it will be found convenient to make the solution of such a strength that the alkaloid of 10 grams of root will be contained in 25 c.c., dissolving with the aid of a few drops of dilute sulphuric acid.

It is advisable in volumetric assays to exhaust more than 10 grams of drug, so as to get sufficient solution for several trials if necessary. With a very limited supply of drug it is obviously safer to weigh the emetine. To make a correction, first find the *apparent* ratio, by dividing the volume taken by the amount of emetine found by Mayer's solution. A reference to the table will then give the factor (choosing the nearest number) by which the

amount found has to be multiplied. Column I. shows the apparent ratios. Column II. gives the factors necessary for correction.

I.	II.	I.	II.	I.	II.	I.	II.
1: 50	1.240	1: 170	1.180	1: 290	1.120	1: 410	1.060
60	1.235	180	1.175	300	1.115	420	1.055
70	1.230	190	1.170	310	1.110	430	1.050
80	1.225	200	1.165	320	1.105	440	1.045
90	1.220	210	1.160	330	1.100	450	1.040
100	1.215	220	1.155	340	1.095	460	1.035
110	1.210	230	1.150	350	1.090	470	1.030
120	1.205	240	1.145	360	1.085	480	1.025
130	1.200	250	1.140	370	1.080	490	1.020
140	1.195	260	1.135	380	1.075	500	1.015
150	1.190	270	1.130	390	1.070	510	1.010
160	1.185	280	1.125	400	1.065	520	1.005

The following are examples of corrections applied to four determinations:—

Amount taken.	Found.	Observed ratio.	Corrected amount.
0.1421 gram.	0.1171 gram.	1: 85	0.1434
0.1421 „	0.1209 „	1: 248	0.1384
0.1421 „	0.1323 „	1: 377	0.1428
0.0945 „	0.0793 „	1: 126	0.0955

The various high results obtained by the volumetric method appear to be principally due to the interference of foreign matter dissolved out of the root by the solvent employed. Thus, ipecacuanha has been frequently reported as containing 3 or more per cent. of alkaloid, whilst the average amount of emetine in good samples does not greatly exceed 1 per cent. The following is quoted as an example, showing the influence of bulk and extractive matter in a liquid prepared for titration in the manner usually recommended. To 60 grams of the powder prepared from the bark of the root, the woody portion being entirely rejected, 600 c.c. of 90 per cent. alcohol were added, and 60 drops of diluted sulphuric acid, and shaken occasionally during twenty-four hours. At the end of that time the liquid portion was filtered off, measured, and the alcohol removed by the heat of the water-bath. Evaporation was carried on until 25 c.c. of the liquor was equal to 10 grams of the drug.

Emetine indicated by
Mayer's Solution (1 c.c. = '0180 gram).

- I. 25 c.c. diluted to 100 c.c. = 2.17 per cent.
II. 25 c.c. not diluted . . . = 1.7 per cent.

The amount of emetine in the powder, as determined by the lime process, was 1·65 per cent. In the stronger solution the figures closely approach the correct percentage; as however the amount of emetine present, taken as pure alkaloid, would not give the full amount in the degree of concentration of this liquor, it serves to show the influence of the extractives on the result. To fully corroborate this view, and to prove that the whole amount of alkaloid could be obtained after the lime treatment, I made experiments with pure emetine in the manner employed for assaying the powdered drug. Strong spirit (sp. gr. ·838) was employed to exhaust the lime residue in the first instance, in accordance with statements previously made, and the alkaloid was finally recovered with chloroform and ammonia, and weighed.

I. 0·1205 gram anhydrous emetine gave 0·1200 gram recovered.

II. 0·0945 gram anhydrous emetine gave 0·0950 gram recovered.

This shows that whatever action is exerted by the lime on the alkaloid, with proper exhaustion the original weight may be recovered. As rather more was obtained than was anticipated—no working loss, say one milligram, being apparent—further small amounts of the same emetine were exposed to the heat of the water-bath for varying periods. It was found in each instance that a steady increase of weight took place on prolonged heating.

I. Pure emetine, weighing 0·0670 gram, lost on heating in a porcelain capsule on the water-bath, water equivalent to 6·71 per cent., and weighed in the anhydrous condition 0·06250 gram. No further loss occurred up to one hour of further heating. At the end of two hours it still weighed 0·0625 gram, but regularly increased in weight after that time, until, after twelve hours' heating and exposure, its weight was 0·06525 gram.

II. A second portion, weighing in the anhydrous condition 0·09375 gram, after eight hours' exposure on the water-bath was found to weigh 0·0950 gram.

In both the experiments the emetine, after drying to constancy, was distributed in a thin layer over the dish by means of alcohol, sufficient being added to dissolve the alkaloid.

III. Anhydrous emetine weighing 0·262 gram, after fifteen hours' exposure weighed 0·2840 gram.

Alcohol was not added in this instance.

The emetine recovered after treatment with lime, as well as that subjected to heat alone, gave when dissolved in acidulated water highly coloured solutions; and experiment showed that a

decided amount was removed by chloroform when shaken with the acid liquor. By this means I found it possible to determine to some extent the amount of change which had taken place. The following different amounts of emetine were contained in 10 c.c. of alcohol; and that amount was in each case measured off with a pipette, and evaporated in a small porcelain dish. The residue so obtained was dissolved in 50 c.c. of acidulated water (sulphuric acid), and washed three times with three successive 20 c.c. of chloroform. The united chloroform washings were evaporated to dryness, and either dried to a constant weight, or heated for a further period.

I. A residue from 10 c.c. of an alcoholic solution = 0.09375 gram, dissolved and washed with chloroform as described, yielded 0.0035 gram, equivalent to 3.19 per cent. of the whole.

II. A residue from 10 c.c. as above, treated for ten hours on a water-bath, gave when washed 0.0115 gram, equivalent to 12.25 per cent.

III. A residue from a similar alcoholic solution of emetine, but weighing 0.200 gram, gave after heating for fourteen hours matter equivalent to 13.25 per cent.

IV. A residue from an alcoholic solution weighing 0.0950 gram, redissolved in 200 c.c. water acidulated with sulphuric acid, and treated with lime as in the lime process, gave when finally treated in acid solution with chloroform, 16.8 per cent. of removed matter.

The dry residues from the chloroform washings when redissolved in acidulated water reacted with Mayer's solution. The residue of Exp. I., however, gave only a slight opalescence, showing that the altered alkaloid, removed by chloroform in acid solution, carried with it a certain small amount of emetine.

In acetic solutions of emetine a similar alteration takes place, judging from the increase in colour which occurs on evaporation; and I have found that acetic solutions of the pure alkaloid give, after evaporation to dryness and re-solution, too low results when titrated with Mayer's solution.

Ex.—Fifty c.c. of a nearly colourless acetic solution of emetine, with the addition of 200 c.c. of water, gave on evaporation to dryness and re-solution in 50 c.c. of the same mixture of acetic acid and water as originally taken, a sherry-coloured liquid. This required 4.6 c.c. of Mayer's solution to complete the reaction, indicating 0.08694 gram of alkaloid. A similar amount (50 c.c.) of the original solution before evaporation consumed 5.2 c.c., indicating 0.09828 gram of emetine.

Following the details given under the lime process, we may, in my opinion, best estimate the emetine in wine and similar preparations by that method, filtering the liquid after driving off the alcohol on the water-bath, and after allowing it to cool. The weighed residue thus found would, in accordance with experiments quoted, include any alkaloid altered during the process of assay.

VINUM IPECACUANHÆ.

By J. C. SHENSTONE.

Perhaps the best as well as the earliest papers upon the decomposition which takes place in this preparation are by Mr. Geo. Johnson, who at a pharmaceutical meeting, November 7, 1861, recommended an acetum ipecac. in the place of the wine, and suggested the process for preparing the vinegar, now adopted in the Pharmacopœia for preparing the extract in making the wine.

At the Pharmaceutical Conference in Birmingham, 1865, he followed his previous paper by a report upon a more elaborate research. He made preparations from carefully selected wines from different countries, and found that in every case the deposit was formed; and further, that the deposit was still formed, but less in quantity, from a mixture of spirit of wine, acid, and water; and lastly, that the deposit contained acid tartrate of potassium and emetine. He arrived at the conclusion that it was partly caused by the absorption of oxygen by the ipecacuanhic acid.

During later years contributions to the subject have been made by Mr. Brown,* Dr. Dyce Duckworth,† Mr. Barnes‡ (recommending the present process of the Pharmacopœia), Mr. Maben,§ Mr. Peter Boa,|| and others, whose results fairly accord with those of Mr. Johnson, but it has been pointed out that the precipitation is much more rapid in a wine containing an appreciable amount of tannic acid, than from wines practically free from that constituent.

On account of the importance of the preparation, I decided that time would not be wasted by trying to find a method by which a

* *Pharm. Journ.*, March, 1867.

† *Ibid.* March, 1872.

‡ *Pharm. Conference*, Sept., 1880.

§ *Pharm. Journ.*, Jan., 1886.

|| *Ibid.*

really permanent liquid preparation of ipecacuanha could be produced, and it occurred to me that an interesting mode of attack would be to compare the behaviour of samples of the preparation made with natural wines, with various additions, and also with artificial substitutes of known composition, with a view of settling definitely the cause of the decomposition, and of finding how it could be prevented.

I considered that as sherry varies much in its composition, the value of my experiments would be enhanced by the use of samples of wine, the principal constituents of which, at any rate, had been estimated. After examining several wines, I selected the two which in subsequent experiments I will call A and B, as best suited to my purposes.

In examining the sample of wine I followed Thudichum and Dupré. A comparison of the table given below, which shows the result of my analyses, with the tables given by those authors, will show that my wines were normal wines, containing rather a large percentage of acid tartrate of potassium, but as after immersing the wines for twenty-four hours in ice, no deposition of acid tartrate of potassium took place, I did not think this of consequence. Nor did I consider the low percentage of ash in sample B of consequence, a large portion of the ash in sherries being due to the process called plastering the wine.

Character of Sherry.	Percentage absolute alcohol.	Percentage total acidity as tartaric acid.	Percentage free fixed acid as tartaric acid.	Percentage volat. acid as acetic acid.	Percentage acid due to cream of tartar.	Tannic Acid.	Percentage ash.	Sp. gr. minus alcohol at 17.5 C.	Sp. gr. of wine at 15 C.
A. Very good pale light wine.	16.25	.3806	.3298	.0405	.0205	No perceptible amount.	.4685	101.64	99.28
B. Brown Sherry of fuller flavour.	15.79	.3964	.3166	.0638	.0291	No perceptible amount.	.3430	101.84	99.48

The percentage is in each case calculated as weight in volume.

Having selected the wines, I next prepared the extract, using a sample of ipecacuanha with a well-developed, unbroken cortical portion. It was coarsely powdered, macerated for twenty-four hours in acetic acid, and packed lightly in a cylindrical percolator, 1 lb. forming a column 8 inches deep. The first portion which

passed was of a dark brown colour, but the percolate became straw coloured after one gallon had passed. A sample taken from the first gallon changed to a dark green colour upon the addition of a few drops of ferric chloride solution, but after $1\frac{3}{4}$ gallon had passed, the percolate became colourless, left practically no residue on evaporation, and was unaffected by ferric chloride solution. I therefore discontinued the process, the percolation having taken two days.

The evaporation of the percolate took thirty-six hours, and upon dissolving a small portion of the extract in water, and adding ferric chloride solution, no green coloration was produced; hence evidently the ipecacuanhic acid had undergone some change, and if Mr. Johnson's suspicion was correct, that the decomposition is partly due to the absorption of oxygen by the ipecacuanhic acid, this change during the evaporation might explain the superior keeping properties of the new preparation. I have examined several samples of extract prepared for wine, and in every case noted the same change.

I tested the extract qualitatively for emetine by the method given in the "Pharmacographia," and got an abundant precipitate, which turned yellow on the addition of solution of chlorinated lime.

The total weight of extract was 72 grains to each ounce of root used.

I may here mention that whilst all those samples prepared from natural wine when shaken produced moderate froth, which quickly subsided, those prepared with artificial wine in every case produced copious froth, which did not subside for many hours; from this it would appear that the so-called saponaceous principle contained in ipecacuanha root is not destroyed by the heating in the new process. I have confirmed the above by subsequent observations.

In examining the table it is at first difficult to come to any conclusion. Probably the apparent inconsistency of some of the results is due to there being (as was suggested by earlier workers) two agencies at work in the decomposition of ipecacuanha wine, *i.e.*, some constituent in the preparation itself, and the air. That the air plays an important part in the decomposition, I think I may say I have since proved by making a sample of ipecacuanha wine, putting half into a corked bottle, and half into a flask, which latter I sealed hermetically after expelling the air by boiling. The portion in the bottle had commenced to precipitate

after seven days, in a few weeks the precipitate was fairly large: whilst there was no perceptible precipitate in the sealed flask after three months.

That the constituents of the wine play an important part would appear, first from the fact that none of the artificial wines (with the exception of that containing tannin) had commenced to precipitate after fourteen days, and with the same exception after six months they had all small precipitates; and further, from the size of the insoluble residue, in the case of A 9 and B 9, and the different character of the precipitate, it would appear that the presence of one part of tannin in 1000 of wine caused the precipitate to commence even whilst maceration was progressing.

In sample C 4, the artificial wine containing tannin, the precipitation does not appear to have gone so far during maceration as in the natural wine containing tannin, but later on that sample produced the largest precipitate out of the twenty-six. It must not be forgotten that the ordinary test for tannin does not prove the absence of the tannins derived from the grape, which may play an important part in the decomposition.

The fact that the only sample prepared with natural wine which showed no sign of a precipitate after fourteen days, was that containing glycerine, and one sample with sugar (those samples containing sugar being also in most cases better than the average, though the difference was not so marked as with glycerine), and that the only sample after six months which had no precipitate (having in its place a fungoid growth on its surface) also contained glycerine, suggested that glycerine distinctly delayed the precipitation. I therefore made a preparation containing:—

Spt. Vini rect.	23 parts.
Glycerine	10 „
Malic Acid	0.5 „
Water	67 „
Ext. Rad. Ipecac.	B.P. proportion.

This shows no signs of changing after three months, but still remains perfectly brilliant. How much longer it will continue bright, I of course cannot say.

I think that these experiments, considered in connection with previous writings upon the subject, lead to the conclusion that if we are to have a thoroughly satisfactory liquid preparation of ipecacuanha, we must use a medium in which the portion of the extractive of grape wine which is partly the cause of the precipitation, is absent, and also that there must be some body present

which will protect the ipecacuanha from the action of the air. I do not claim that the formula given above will answer every requirement,—to get a perfect preparation it will no doubt be necessary to repeat the experiment several times under different circumstances,—but I think it promises to lead to a satisfactory and permanent preparation, differing but slightly from ipecacuanha wine in appearance, whilst the addition of a little ænanthic ether would most likely make it very similar in flavour. It will further be necessary to get the medicinal efficiency of such a solution tested.

In the table on the opposite page will be seen the formulæ according to which I prepared a series of samples of ipecacuanha wine, together with remarks upon their keeping properties, and other particulars.

A vote of thanks having been passed to the authors of these papers,

Mr. MARTINDALE said he had made two lots of ipecac. wine by the B.P. process, and about ten months ago published his results. He found the difficulty of percolation was the great obstacle to overcome. About a month ago he had examined these and found that they had remained perfectly clear up to that time, so that as to keeping the preparation clear it answered admirably.

Mr. CONROY considered that in the B.P. process it was a great mistake to order the *powdered* root to be percolated with the menstruum. He found that if the root were taken whole, exhausted with an acetic menstruum, and the extract evaporated to dryness, a much better result was obtained than by percolation with the root in a state of powder. He gathered that Mr. Shennstone would substitute a mixture of spirit and water with glycerine or sugar for sherry, but this was quite unnecessary. By following the B.P. process, only using the root whole, a preparation could be obtained which would keep bright a considerable time. A good result could also be obtained by simply macerating the *uncrushed* root in the sherry, provided the latter was of full alcoholic strength.

Mr. UMNEY asked if Mr. Conroy had estimated the emetine in the extract obtained by his method, and compared it with that obtained from the powdered root; unless he had done so they were a little in the dark as to the value of the two methods.

Mr. CONROY said he had estimated the emetine, and had obtained satisfactory results. He believed the emetine resided entirely in

Sample of Wine.	Composition.*	Weight of insoluble residue after macerating 48 hours.	First showed signs of precipitation.	Appearance after 6 months.
A 1	Natural sherry†	10.3 grs.	Just perceptible after 7 days	Considerable precipitate.
B 1	"	10.7 "	Perceptible after 14 days	" "
A 2	Nat. wine+5 per cent. absolute alcohol	10.11 "	Distinctly commenced after 7 days	Moderate precipitate.
B 2	"	11 "	"	" "
A 3	Nat. wine+1 per cent. malic acid	9.8 "	"	" "
B 3	"	10.2 "	"	" "
A 4	Nat. wine+1 per cent. glacial acetic acid	10 "	"	Copious precipitate.
B 4	"	10.8 "	"	" "
A 5	Nat. wine+5 per cent. sugar	10.7 "	"	Comparatively small precipitate.
B 5	"	10.7 "	"	" "
A 6	Nat. wine decolorized animal charcoal to decompose tannins nat. to wine.	10.4 "	"	Moderate precipitate.
B 6	Nat. wine decolorized animal charcoal to decompose tannins nat. to wine.	10.7 "	"	" "
A 7	A 6 wine+5 per cent. sugar	12.8 "	Scarcely perceptible after 7 days	" "
B 7	"	11.8 "	No precipitate after 14 days	" "
A 8	Nat. wine+3 per cent. glycerine	10.5 "	"	Copious precipitate.
B 8	"	11 "	"	" "
A 9	Nat. wine+1 per cent. tannin	21.5 "	Copious precipitate after 7 days	Large precipitate very light in colour.
B 9	"	20.5 "	"	" "
A 10	Nat. wine+.25 per cent. hydrochloric acid	10 "	Perceptible after 7 days	Small precipitate.
B 10	"	10.6 "	"	" "
C 1	Absolute alcohol 20 parts+water 80 parts	10 "	No signs after 14 days	" "
C 2	C 1 +.5 per cent. malic acid	9.8 "	"	" "
C 3	C 1 +.5 per cent. acetic acid	11 "	"	" "
C 4	C 2 +.1 per cent. tannin.	13 "	Copious precipitate after 7 days	Much the heaviest precipitate.
C 5	C 2 +.5 per cent. sugar	10 "	No signs until after 14 days	Very slight precipitate and fungoid growth.
C 6	C 2 +.3 per cent. glycerine	11.1 "	"	No precipitate—fungoid growth.

* Percentage in all cases indicates weight in volume excepting in C 1.

† The smaller differences in weight of insoluble residue are chiefly accounted for by my having used rather large filter papers to avoid undue exposure to air.

the cortical portion of the root, and there was no difficulty in extracting it.

Mr. SHENSTONE asked if Mr. Martindale had noticed the condition of the wine after two months by shaking the bottle, or was it in a clear bottle, so that he could see the bottom.

Mr. MARTINDALE said it was in a clear bottle, and it had been there more than ten months. There was no deposit at all.

Mr. SHENSTONE said he had made inquiries at various places, and always found that where the wine had been kept any length of time there was a deposit. In his own case, by far the largest use that ipecac. wine was put to was to retail to families chiefly living in the country, to give to children liable to suffer from croup, it being thought it was the safest emetic they could use. That being so, it was evident that the wine was often kept in very small bottles for an indefinite time, and it was desirable to have a preparation which would keep under those circumstances, and not merely for dispensing purposes, where six months would be sufficient.

The next paper read was on—

AMERICAN MUSK.

BY CHARLES SYMES, Ph.D.

Some few years since several articles appeared in the Canadian and United States pharmaceutical journals, by Messrs. Christian and Gregory, these in turn were copied into European journals devoted to pharmacy, which created considerable interest in this substance. It was assumed that it would soon become an article of commerce, and for many purposes replace the more expensive kind. With some little difficulty I obtained a supply, consisting of two thin flexible sheet-iron packages, each containing half a pound of the pods or follicles, of a flattened oval shape, brown colour, and smelling strongly of musk and rancid fat.

The animal yielding "American musk" has already been described; it is known as the musk rat (*Fiber Zibethicus*), related to the beaver, is amphibious, and abounds on the margins of rivers and lakes in the United States and Canada; it is trapped for its fur, and in directing attention to its musk follicles, Mr. Christian was attempting to utilize a waste product.

Accompanying the supply which I obtained were the following particulars as to its mode of use:—

“For Toilet Soaps.”—Take one pound of the pods and bruise it with a portion of silex or glass, add four pints strong alcohol and 2 per cent. solution potash 6° B., and keep in a moderately warm place for three or four weeks. Such substances as civet, styrax, vanilla, benjamin; and such oils as cloves, caraway, serpolit, and cassia are the usual additions to this musk in toilet soap, according to the kind wanted.

“For Satchet Powder.”—Take one pound of the pods, place them in some convenient vessel with four pounds of powdered orris root (stirring occasionally) for two or three weeks, when the pods can be sieved out and used for tincture, as above. The musk orris root can enter into musk, violet, and heliotrope satchets.

“For Perfuming and Flavouring.” Take one pound of the pods and mix with four pints strong alcohol, adding 2 ounces slaked lime to this quantity, and infuse about a month. For flavouring, the oils of rose, thyme, cloves, cinnamon, and extract of vanilla, are the usual accompaniments.”

The sacs were found to be saturated with oil, and it became of interest to determine whether the odorous principle resided in this or the tissues. Some portions were cut up and macerated several days in almond oil, with occasional agitation, and on filtering it was found that the menstruum had taken up very little, if any, of the musk odour, whilst the rancid fatty smell was distinctly perceptible.

Ether dissolved out the oil, but carried with it some colouring matter and a little of the musk odour. A further quantity of 250 grains was cut up, laid between folds of stout bibulous paper, and submitted to hydraulic pressure, when 25 per cent. of oil was readily separated; this, however, carried with it some brown extractive matter which possessed the musk odour, and it was evident that such a method could not be adopted in practice for separating the oil. It was subsequently found that bibulous paper with slight pressure possessed some advantages, and that this method was worth adoption.

Essence prepared with the use of calcium hydrate, as in the before-named formula, was partially freed from rancidity, but possessed a peculiar pungency of its own, which seemed undesirable, and it readily became turbid, requiring to be filtered over and over again. In another experiment a little liquid ammonia was substituted for calcium hydrate, and that with decided advantage.

The sample marked “Essence two years old” was so prepared.

In another bottle this essence is mixed with an equal quantity of lavender water, so that an opinion may be formed as to how far it is possible to use it in perfumery. It was found that if a small quantity only of ether were poured on the pods, and poured off almost immediately, little of the musk odour was removed, and the pods were more readily acted on by the spirit with which they were subsequently treated; and further, that weak spirit dissolved less of the oil than strong spirit, but when rendered alkaline it took up quite as much of the musk odour. Reasoning on these and other facts, the following formula was deduced, and is, I believe, the most suitable for dealing with a somewhat unsatisfactory article.

Take 4 ounces of the pods, cut small and press gently between several folds of bibulous paper, wash lightly with about 2 ounces of methylated ether, pour off, and allow the remaining ether to evaporate by a short exposure to the air; put into a wide-mouthed bottle with 15 ounces rectified spirit, 5 ounces distilled water, 20 minims liquid ammonia, and $\frac{1}{4}$ oz. powdered animal charcoal; allow all to stand, with occasional agitation, for one month, and filter through magnesia. A sample of essence so prepared and a sample of soap perfumed with it are shown. The musk odour is there, but still a trace of the rancidity remains, and I am of opinion that the remedy is chiefly in the hands of the trappers of the animal or the collectors of the pods. The musk odour is, I believe, a distinct secretion, and when quite fresh much of the oil could be removed without materially impoverishing the perfume value of the follicles; thus more care could be expended on their preservation, so as to avoid this strong rancid greasy odour, for, until this is done, the American variety is not likely to make much way against genuine Tonquin musk.

A vote of thanks was passed to Dr. Symes for his paper.

In the absence of the author, Mr. Plowman then read the following note on—

IODOFORM.

By D. B. DOTT.

In a paper read to the Conference last year, I gave the results of some experiments on the volatility of iodoform. Dr. Vulpus*

* *Pharmaceutische Post*, February 27, 1886.

has called in question my statement that iodoform in certain circumstances loses 6·7 per cent. of its weight, per hour, when placed in a water-bath. Dr. Vulpius says "bei 100°," but as he afterwards in referring to his own experiments says, "bei Wasserbad-temperatur," it is probable he means the latter in all cases. As is well known, the two things are by no means the same. I used a copper water-bath of ordinary construction, the internal space being something less than a cubic foot. When a beaker of water is placed on the shelf in the centre of this bath, the maximum temperature attained is 71° C., which would be approximately the temperature at which the iodoform was exposed. There are evidently many circumstances which must affect the volatility of a solid when placed in the water-bath, such as the state of division, the thickness of the layer, and the time of exposure. As the watch-glass and material take a finite time to attain the temperature of the bath, it is obvious that the result calculated from an exposure of five hours will be higher than that calculated from an exposure of half an hour. In short, the values obtained in any such experiments cannot be stated with scientific precision, though they may be very useful for all that. It has to be noted that Dr. Vulpius employed iodoform in fine powder, while I used the small commercial crystals. The state of division is not, however, of so much importance as the thickness of the layer. I have repeated my experiments, and get an average of 6·68 per cent. per hour as the loss of weight of iodoform in a water-bath, which number is remarkably near that formerly noted.

A vote of thanks was passed to Mr. Dott.

In the absence of the authors, the two following papers were read by Dr. Thresh:—

QUINOLOGICAL WORK IN THE MADRAS CINCHONA PLANTATIONS.

BY DAVID HOOPER, F.C.S.,

Government Quinologist.

Last year I communicated to the Conference at Aberdeen the results of some experiments made in the cultivation of cinchona. A number of analyses were given of the different varieties of bark grown on the Government and other estates. It was shown how

the alkaloids were distributed in old succirubra trees, and it was noticed how natural shade and the process of mossing promoted the increase of alkaloids in the bark. Some of these conclusions were perhaps not altogether unknown before, but I thought it desirable to confirm results which are liable to vary under different conditions of age. Another year's work shows some more extended investigations into the effect produced on alkaloids by the renewal of bark and by the manuring of trees, and tables are compiled from numerous analyses, showing the rise of alkaloids in growth and their deterioration by age and other causes. I have again been permitted to quote extracts from my annual report, which has lately been forwarded to Government through Mr. Lawson, Director of the Cinchona Plantations.

Renewal by Shaving.—Shaving cinchona trees has been for some years a method of harvesting bark which in some districts works better than that of stripping and mossing. The cellular and richer portion of the bark is removed in this way, and the librous portion is left. The bark thus treated thickens again, and the shavings taken from it are found to be richer still in alkaloids. The analyses of some succirubra shavings taken from trees grown in the Ouchterlony Valley, will show to what an extent trees may be improved by this method. The renewals were taken after intervals of twelve months; the experiment therefore lasted over three years.

	Quinine.	Other Alkaloids.	Total.
Original Bark	1·35	5·87	7·22
Once renewed	2·46	4·22	6·68
Twice renewed	3·60	3·99	7·59
Thrice renewed	3·87	3·71	7·58

The increase of quinine during the first and second year by renewing is most satisfactory; the increase is not so prominent in the third year, but the bark is good, and indicates that shaving for at least four years might be permitted. The trees upon which these experiments were made were six years old when the original bark was taken. If at this comparatively early age they are not injured by shaving, and renew their bark so well, it is not desirable to wait for the trees to become more matured.

When trees are allowed to grow until they are over twelve years of age, and then shaved, the renewal sets in more slowly, and the

resulting bark does not compare more favourably with the original bark than if the tree operated upon had been half that age. This may be instanced by quoting some more analyses. Last December some interesting samples were sent by the manager of the Glenrock Company, S. E. Wynaad, consisting of some natural and renewed shavings of *succirubra* taken from trees of six and twelve years of age. The following is the analysis of four of the samples :—

	Sulphate Quinine.	Total.
Red bark, 6 years, natural	1.34	5.00
" " renewed 2 years	2.54	6.95
" 12 years, natural	2.43	7.41
" " renewed 2 years	2.71	7.01

Thus it is seen that by renewing a six-year old tree, 90 per cent. more of sulphate of quinine is obtained, and by working on a twelve-year old tree only an increase of 12 per cent. takes place during the same period of two years. With regard to the total alkaloids, it should be also noticed that the shaving has made an increase of 39 per cent. in the younger tree, while the older bark has somewhat deteriorated. One of the most important features in these results is, that the renewed bark from the six-year old tree is superior to the natural bark from trees of twice the age.

I have had very few opportunities of observing the effect of shaving on pure Ledger barks, containing little, if any, alkaloid, besides quinine; but it appears that hybrid Ledgers of the broad-leaved variety, holding cinchonine, are capable of great improvement by the shaving process, as the following renewals of eleven months will show compared with the natural bark of six-year old trees.

	Sulphate Quinine.	Total.
Ledger, narrow leaf, natural, 1885	4.09	5.97
" " renewed, 1886	6.62	8.49
Ledger, broad leaf, natural, 1885	2.90	6.61
" " renewed, 1886	5.19	8.51

The sulphate of quinine in the narrow-leaved Ledger had in-

creased 62 per cent., and in the broad-leaved Ledger 79 per cent.; the greater increase in the latter variety is due to the presence of other alkaloids, which appear to develop quinine in the growth of the tree.

Shaving old trees has certainly not had a beneficial effect in some trials made on Government estates. Both officinalis and succirubra trees, from sixteen to twenty-one years of age, cannot well bear the removal of the bark in this way; the renewal takes place slowly, and is found to be impoverished instead of enriched. An officinalis on Dodabetta, of twenty years' growth, was shaved; the shavings gave 3.66 per cent. sulphate of quinine. After six months some renewed shavings were taken, and found to yield only 1.85 per cent.; the bark was then commencing to decay, and the tree has since died.

Experiments in Manuring Cinchonas.—The effect of manuring cinchona trees in order to stimulate their growth and produce a greater yield of alkaloids, has recently been tried at Naduvatam. The first experiment was made upon a succirubra of seven years' growth. Cattle manure, which had been previously kept for some time in closed pits, was applied some six months before the bark was taken for analysis. A sample of bark from a tree in the same plot, but which had not been manured, was collected at the same time for comparison. Two samples of magnifolia bark were taken from trees which had been manured in a similar manner to the succirubra; the first was seventeen years, the second twenty years old, and samples from unmanured trees were taken for comparative analysis at the same time. The results of the examinations are here tabulated:—

	Quinine.	Cinchonidine.	Cinchonine.	Amorphous Alkaloids.	Total.
Succirubra, manured	2.29	3.78	1.94	.52	8.53
„ unmanured	1.51	4.13	2.03	.32	7.99
Magnifolia, 1, manured	3.78	3.90	.28	.82	8.78
„ „ unmanured	3.13	4.39	.56	.39	8.47
„ 2, manured	2.59	3.49	1.21	.52	7.82
„ „ unmanured	2.62	2.67	.67	.56	6.52

It will be seen that the manuring has had the effect of increasing, in each instance, the amount of total alkaloids in the bark; and the quinine—the most important feature—has received a gain

of 52 per cent. in the succirubra, and 20 per cent. in the first magnifolia. In the older magnifolia bark the quinine remains about the same in quantity; and if no other influence is at work, it might be inferred that older trees are not so sensitive to the action of manure as younger and more vigorous-growing trees which have not reached maturity. The food of such plants as cinchonas which yield alkaloids in large quantity, must of necessity contain some nitrogenous element, and as this must be taken from the ground, it is only fitting that a manure of this kind, which contains some constituents that are similar in their nature to alkaloids, should be supplied periodically to the soil. Regarding the question from a commercial aspect, the higher value would cover the expense of the manure and the cost of its application to the land. The succirubra bark mentioned in the first experiment, if the unit were 4*l.*, would realize in the market 8*l.* per pound, whereas the bark of the manured tree would be worth more than 1*s.* per pound. I believe the effect of manuring would be more apparent in crown and Ledger barks, with large proportions of quinine in the total alkaloids; in such cases, the extra outlay on manurial agents, compared with the additional value of the bark, would be much more remunerative.

Increase of Alkaloids with the Age of Trees.—A question of much importance in cinchona cultivation is the age to which trees should grow before the bark can be profitably taken. To settle such an inquiry a large number of analyses of barks taken from trees of all ages should be available. In the following tables I have made a selection of both Ledger and red barks, and have arranged them according to age. Some of the figures are averages of two or more analyses, and as the two lists represent some forty samples, I hope they will help to throw some light on the subject.

The first list comprises natural barks of the narrow-leaved variety of *C. Ledgeriana*, and, with one exception, they all came from the Wynaad district.

The second list is made by taking from my laboratory journal all those red barks whose ages have been determined, whether they came from the Government plantations at Naduvatom, or from private estates in Wynaad, Coorg, or Travancore.

Ledger Barks.	Quinine.	Cinchonidine.	Other Alkaloids.	Total.
20 months	1·68	·66	2·77	5·11
2 years	2·18	·65	2·69	5·52
3 „	3·28	·55	2·90	6·82
3½ „	4·73	·93	1·81	7·46
4½ „	4·97	·79	1·78	7·54
5 „	4·57	1·02	1·46	7·05
5½ „	5·09	1·06	·55	6·70
5½ „	7·54	·31	1·15	9·00
6 „	6·52	·76	·88	8·16
6½ „	5·97	1·18	1·00	8·15
8 „	7·59	1·16	1·45	10·20
20 „	5·58	1·24	·85	7·67

In the Ledger barks it will be noticed that there is a steady rise of quinine up to the age of between five and six years, after which there is no apparent increase.

In the second table of red barks the same fact is shown, that the bark has attained its maximum content of alkaloid when between five and six years of age. The quinine increases up to twelve years; but, as pointed out before, the renewed barks of the younger trees much exceed the slightly increased value of these older barks. The trees of sixteen and twenty years show a marked deterioration in alkaloids, although the bark is often in large, thick, fibrous pieces, similar to the drug that was originally exported from the South American forests.

Red Barks.	Quinine.	Cincho- nidine.	Cincho- nine.	Amorphous Alkaloids.	Total.
2 years	·55	·72	1·20	1·22	3·69
3 „	·85	1·75	1·67	·99	5·26
3½ „	1·08	1·65	1·15	·64	4·52
4 „	1·13	2·03	1·79	·58	5·53
4½ „	1·02	2·64	1·78	·50	5·94
5 „	1·23	2·72	2·36	·52	6·83
5½ „	1·32	2·15	3·11	·63	7·21
6½ „	1·31	3·22	2·18	·71	7·42
7 „	1·70	2·69	2·28	·93	7·60
7½ „	1·78	3·18	1·97	·53	7·46
12 „	1·81	2·62	2·08	·90	7·41
16 „	1·08	·94	1·04	1·57	4·63
20 „	·78	1·13	1·37	·97	4·25

Effect of Mould on Bark.—It has been stated that bark loses much of its virtue when allowed to get mouldy, or when kept in a damp atmosphere. I was asked more than a year ago to analyse

some mouldy bark to obtain its value, but not knowing the composition of the freshly dried bark, the results would not have been very useful. I have therefore made an experiment which shows that little, if any, effect is produced by prolonged contact with mould. A sample of powdered bark of known composition was taken in December, 1884, and kept in an open dish on the floor of a dark, damp room; a fungus (*Penicillium*) set in in a fortnight, and spread itself over the surface of the powder, and slightly increased its weight. The bark was constantly stirred, so that fresh bark from beneath might be influenced by the fungus. It was mixed occasionally for ten months, and as the mycelium had then penetrated to every particle of the powder, it was analysed in October, 1885, with the following results:—

	Original Bark.	Mouldy Bark.
Quinine	2·82	2·80
Cinchonidine	1·22	1·25
Quinidine	·18	·11
Cinchonine.	·90	·87
Amorphous.	·31	·45
	<hr/> 5·43	<hr/> 5·48

It is thus manifest that, the analyses being almost identical, mouldy bark of ten months is not necessarily deteriorated.

CINCHONA CULTIVATION IN SOUTH AMERICA.

By DAVID HOWARD, F.I.C., F.C.S.

Although Ceylon has of late occupied, in the bark market, the most prominent position of all the countries where cinchonas have been cultivated, it is to other quarters that we should look for reliable information on the scientific points involved.

Vast as has been the scale of the cultivation in Ceylon, the soil of the island is by no means of the most favourable for the growth of the cinchonas, and, unfortunately, far too little care has been taken to avoid the danger of hybridization, which takes place with marvellous facility whenever more than one species is found in a district, unless the greatest care is taken to isolate the seed-bearing trees. We thus find that Madras and Java give far better opportunities of studying the effect of cultivation on pure strains of the more valuable species, and it is interesting to add to what we have learned from the plantations in those countries some light from those in the natural home of cinchonas in South America.

The jealousy which made it so difficult to obtain cinchona plants in the first instance still remains to a great extent in Bolivia, and although we have valuable information as to the progress of the plantations in Schuhkrafft's consular reports, no scientific information can be obtained from that quarter except what is derived from the bark which already reaches us from them in considerable quantity. This we find to be of very fine quality, far superior to the average of even selected parcels of the uncultivated bark; a yield of 6 to 7 per cent. of sulphate of quinine is quite as commonly obtained from them as one of 4 to 5 per cent. was from the importations of twenty or thirty years ago; and it is evident that the influence on the calisaya of cultivation is just as favourable in its natural home as in Java. Among them are two new species, the flowers of which are as yet unknown, but the habit of growth of which clearly marks them out as distinct from the hitherto described species. As plants of both are under cultivation, it is hoped that before long we shall be able to add botanical descriptions of them.

The first it is proposed to call *Cinchona Thomsoniana*, after Mr. Thomson, who discovered it in the Central Cordilleras of the Columbian Andes, in the districts which yield the well-known *Cinchona lancifolia*, the soft bark of commerce. It has very large leaves, and grows with a rapidity equal to that of *succiruba*.

The young bark analysed, which was from trees only two years old, gave already 3.3 per cent. of sulphate of quinine = 2.5 of quinine alkaloid, traces only of cinchonidine, and .55 of cinchonine. The purity of the quinine and rapid growth make this a promising species for cultivation.

The other was discovered by Señor Pombo in the forests of Ecuador; the mature bark presents marked points of difference from the species at present known and yielded.

The sample of cultivated bark of this species, two years old, gave quinine sulphate 5.70 = of quinine 4.28, cinchonidine 0.43; no cinchonine or quinidine. This test is a very high one, and, if the growth is not too slow, it ought to prove a valuable species.

For comparison, I would add the analysis of the typical sample of the finest *lancifolia* bark, the Calisaya Santa Fè, brought over by Mr. R. Cross from Columbia, which yielded of sulphate of quinine 4.2 = of quinine alkaloid 3.15, cinchonidine 1.90, and cinchonine .30.

Of even more interest are samples of bark grown from plants derived from the Government plantations in Jamaica. The his-

tory of these barks shows the great influence of successful cultivation and favourable habitat upon the yield of all alike. The first samples received from Jamaica in 1872 gave the following results:—

	Quinine. = Sulphate Quinine.	Cinchonidine	Cinchonine.
<i>C. Calisaya</i>	1.65 = 2.2	.7	.2
<i>C. officinalis</i>	1.35 = 1.8	.1	.1
<i>C. succirubra</i>	1.05 = 1.4	2.5	.8
<i>C. succirubra</i>	1.12 = 1.5	1.6	2.0

The improvement brought about by careful cultivation is shown in a marked degree by the following samples, received from the same plantations in 1881:—

	Sulphate Quinine. = Quinine.	Cinchonidine.	Cinchonine.	Quinidine
<i>C. Calisaya</i>	4.93 = 3.70	0.60	0.35	0.05
<i>C. officinalis</i> , 5,500 feet	6.95 = 5.18	0.22	0.61	0.15
<i>C. officinalis</i> , 4,800 feet, 13 years old	5.00 = 3.75	0.40	0.12	0.16
<i>C. succirubra</i> , 2,400 feet	1.97 = 1.48	2.98	2.24	0.13
<i>C. succirubra</i> , 3,400 feet (cold spring)	2.40 = 1.80	1.30	3.20	0.00

The descendants of these plants, grown in Columbia, gave the following results:—

	Sulphate Quinine. = Quinine.	Cinchonidine.	Cinchonine.	Quinidine
<i>C. Calisaya</i> , 3 years old, grown at 8,000 feet	4.32 = 3.24	0.66	trace	0.00
<i>C. Calisaya</i> , 22 months old, 7,500 feet	2.71 = 2.03	0.55	0.13	0.00
<i>C. officinalis</i> , 3½ years old, 8,000 feet	4.66 = 3.49	0.21	0.06	0.05
<i>C. officinalis</i> , renewed, 8 months under moss	4.30 = 3.22	0.23	0.07	0.07
<i>C. succirubra</i> , 3 years old	4.94 = 3.75	3.03	0.17	0.07
<i>C. succirubra</i> , renewed, 8 months without moss, grown at 7,500 ft.	7.00 = 5.25	1.50	0.67	0.00

All these samples are from very young trees; and if we may judge from universal experience, the more mature bark will give

even finer results. The Jamaica calisaya is not of the finest type, the percentage of quinine is lower than in the best ledgeriana, and the proportion of cinchonidine is much higher. I should have been inclined to suspect hybridization, but my late uncle, J. E. Howard, F.R.S., after a careful examination of the botanical specimens in 1881, reported of this bark: "It appears to me true to the calisaya type; I should not think that it belongs either to the josephiana or ledgeriana form, but that the exact variety is perhaps not yet published. There is no appearance of hybridity." The succirubra is one of the finest specimens that I have tested. I have found very great variety in the tests of trees of this species growing alongside each other in Ceylon, the quinine varying even in the proportion of three to one, and so it is possible that all the bark from the plantations will not be found of this admirable quality. Still, we have here an additional proof that, whether the result be due to favourable circumstances or to more or less permanent varieties, red bark can be grown of far richer quality than what we usually receive as such from the East Indian plantations.

Amid all the discouragements of excessive production and low prices that planters suffer from at the moment, it cannot be too clearly borne in mind that the prospect of future profit in the cultivation of cinchona turns chiefly upon the cultivation of high testing bark. With favourable soil and climate the richer varieties grow at least as freely as the poorer; and it is evident that, the cost of production being approximately the same, a bark of higher quality may yield a profit when an inferior quality may cause a serious loss. In Bolivia and Java these most important requisites are found, and the analyses I have given above show that the same favourable results may be obtained elsewhere. In the face of such competition, it is evident that the profitable growing of inferior bark is impossible.

On the motion of the PRESIDENT, votes of thanks were passed to the authors.

Mr. PLOWMAN then read the following note on—

COMPOUND SPIRIT OF ETHER.

By D. B. DOTT.

Among the medicaments added to the Pharmacopœia, in its last edition, there are many of great value, and a few whose claims to

be recognised can scarcely be considered strong. *Spiritus atheris compositus* probably belongs to the latter class.

Thirty-six fluid ounces sulphuric acid, and 40 fluid ounces alcohol, were mixed and otherwise treated as directed. The distillation was continued until the liquid in the flask began to darken decidedly, and to evolve sulphurous acid. The distillate amounted to 17 fluid ounces, and was agitated with lime water till neutral to test-paper. The ethereal portion was then separated, and found to measure $10\frac{1}{2}$ fluid ounces. We are next told to expose the liquid to the air for about twelve hours, but the means of doing so is not described. I divided the liquid into two equal parts, placing one in a beaker and the other in a basin. On the expiry of the required time the liquid in the beaker measured $3\frac{1}{2}$ fluid ounces, that in the basin only 80 minims. After a few hours' further exposure, the $3\frac{1}{2}$ fluid ounces were likewise reduced to 80 minims. The 160 minims consisted of two nearly equal portions, the upper of specific gravity about .980, and miscible with water, the lower of specific gravity about 1.065, and not miscible with water. The upper layer no doubt consists essentially of a watery solution of ether, and the lower is principally the so-called "oil of wine." This latter mixture does not appear to have been exhaustively investigated, but it seems to consist for the most part of ethyl sulphate. The points which I wish to urge are the following:—

1st. That the Pharmacopœia directions for the preparation of this compound admit of a very variable result.

2nd. That the process consists principally in the preparation of ether, and the evaporating of the same into space.

3rd. That this extravagance would not be grudged if it resulted in a product of extraordinary potency, but there is no evidence to show that ethyl sulphate or its congeners are of such a nature.

4th. That the introduction of this preparation appears to be a step backward.

A vote of thanks was passed to Mr. Dott on the motion of the PRESIDENT.

GENERAL BUSINESS.

THE BELL AND HILLS LIBRARY FUND.

Mr. PLOWMAN then drew attention to the books on the table, provided by the Bell and Hills Fund. These books, he said, had been selected from a list sent to him from Birmingham, and in addition there were two given by Mr. Thomas Hanbury, in memory of his brother, viz., "The Science Papers" and "Pharmacographia."

The PRESIDENT said he had much pleasure in presenting these books to the Midland Counties Chemists' Association, and as the motto of Birmingham was "Forward!" he thought a better nucleus for something to go beyond it could not possibly be given to the Association than such books as were on the table.

Mr. THOMAS BARCLAY, on behalf of the Association, said he had much pleasure in accepting this handsome gift, and all the more so as it came through Mr. Greenish, who had done so much for provincial education, not only by the address he had given on the previous day, but by his efforts for many years. He trusted that the books would be used by many future students, who at some future Conference would be able to testify to the advantage they had derived from them.

PLACE OF MEETING FOR 1887.

Mr. WOOLLEY (Manchester) said that at a well-attended and very representative meeting of the pharmacists of Manchester and the district, Mr. Bengier and himself were deputed to offer a very cordial invitation to the Conference to visit Manchester next year. It was very evident from the tone of that meeting that every one present was looking forward with great pleasure and interest to the possibility of the Conference visiting Manchester; it was felt that such a visit would be a great honour, and they would do all in their power to make it agreeable and interesting to the members. Manchester was not perhaps so happily situated as regarded its immediate surroundings as some places which the Conference had visited, but still they hoped to be able to show the members something that would be interesting. He alluded to scenes of natural beauty, but it was as an industrial centre that Manchester was eminent, and in that capacity she acknowledged no superior. Most of the national industries were carried on in and around Manchester on a large scale, and he was sure there would be ample material in

this direction to interest the members of the Conference for so long a time as they could stay. Next year they would be engaged, along with all other Englishmen, in celebrating the jubilee year of Her Most Gracious Majesty, and in connection with that event the citizens of Manchester were engaged in organizing an exhibition which promised to be of considerable importance, and would be of universal interest to every member of the Conference. Manchester pharmacists had not hitherto had the honour of entertaining the Conference, but if putting their heart into the work would qualify them, he was quite certain that none of the members would regret travelling so far. He could only say that if in Manchester they were able in any way to approach the hospitality and kindness shown them in Birmingham, they would be amply satisfied.

Mr. BENDER also expressed the great pleasure with which the pharmacists of Manchester looked forward to the approaching visit of the Conference. He had had the gratification of attending fifteen or sixteen of these annual meetings, and of enjoying in common with other visitors the many kindnesses and courtesies which the Local Committees had always provided, and which had culminated in the present meeting. He could promise the Conference that if it would accept the invitation it would receive a most cordial and friendly reception.

Mr. PLOWMAN then moved that the invitation so cordially given be as heartily accepted.

Mr. REYNOLDS seconded the motion.

The motion was then put and carried unanimously.

ELECTION OF OFFICERS.

Mr. REYNOLDS then suggested that, in order to save time, the method of balloting usual in America be adopted. He would tender his ballot paper to the President to represent the whole meeting, unless any one objected.

No objection being offered, the President declared the following duly elected as officers for the ensuing year:

President.—S. R. Atkins, Salisbury.

Vice-Presidents.—M. Carteighe, F.I.C., F.C.S., London; S. Plowman, F.R.C.S., London; C. Symes, Ph.D., Liverpool; G. S. Woolley, Manchester.

Treasurer.—C. Umney, F.I.C., F.C.S., London.

Honorary General Secretaries.—J. C. Thresh, D.Sc., F.C.S., Buxton; W. A. H. Naylor, F.C.S., London.

Other Members of the Executive Committee. W. Elborne, Manchester; A. W. Gerrard, F.C.S., London; T. Maben, Hawick; J. E. Brunker, M.A., Dublin; R. H. Davies, F.I.C., F.C.S., London; D. B. Dott, F.R.S.E., Edinburgh; T. Barclay, Birmingham; M. Conroy, F.C.S., Liverpool; W. H. Symons, F.C.S., F.R.M.S., London.

Local Secretary.—F. B. Bengier, F.C.S., Manchester.

Auditors.—C. J. Arblaster, Birmingham; W. Wilkinson, Manchester.

Mr. SCHACHT said nothing could be more agreeable to a speaker's feelings than to have to express the sentiment of gratitude, and it was with the most sincere feelings on his own part that he had to propose a vote of thanks to the Local Committee for their exertions. As an old member of the Conference, having missed only two meetings, he might fairly say he considered the result of the exertions of their friends in Birmingham had been as satisfactory, if not more so, than on any previous occasion. In one or two respects their proceedings had shown some novelty, and on those innovations, for which the Local Committee was responsible, he thought it might fairly be congratulated. He begged to move—

“That the cordial thanks of the non-resident members of the British Pharmaceutical Conference be given to the Local Committee, especially to Messrs. Barclay, Thompson, Perry, and Arblaster, for the very successful way in which the arrangements connected with the Birmingham visit had been made and carried out.”

Dr. SYMES (Liverpool) seconded the motion with much pleasure. The resolution was carried unanimously.

Mr. THOMAS BARCLAY said he felt that the thanks of the Conference were due mainly to Mr. Thompson, the Honorary Secretary, for the very hearty way in which he had thrown himself into this work. Without his efforts they could not possibly have brought it to a successful conclusion. They had been to some degree handicapped by new arrangements, but had endeavoured to carry them out satisfactorily, and he only hoped Manchester would do better next year. They would have the experience of this year to guide them, and no doubt with the wonderful ability which Manchester always displayed, they would be able to improve upon the Birmingham experiment.

Mr. CHARLES THOMPSON thanked the Conference very warmly for

the hearty way in which this proposition had been received, and said, in doing so, it was only his duty to refer to the assistance rendered by other members of the Committee. Even those who had not taken such an active part in the arrangements had given a deal of time and attention to the matter; but whatever they had done, had been amply repaid by the enthusiastic way in which this resolution had been received.

Mr. PERRY said it was not necessary to add anything to what had already been said, but he was very gratified to find that the efforts of the Committee had given satisfaction.

RETIREMENT OF MR. PLOWMAN, F.R.C.S.

The PRESIDENT said there was one matter, of some little importance, which he could not pass over without a word. After this meeting the Conference would lose the services of one of the Honorary Secretaries, Mr. Plowman. It was only when one was President that the amount of energy which Mr. Plowman had thrown into the work could be understood. Having held this official position, he had been brought into constant contact with Mr. Plowman, and could appreciate more than ever before, the amount of energy and courtesy shown by that gentleman in carrying on the whole of the business connected with the Conference. He therefore begged to move—

“That this meeting of the British Pharmaceutical Conference desires to place on record its sense of the invaluable services rendered by Mr. Plowman as Honorary Secretary for the last five years, and greatly regrets that he has found it necessary to relinquish the office.”

Dr. THRESH thought, as Mr. Plowman's colleague, it best became him to second this vote of thanks. He had had the pleasure of knowing Mr. Plowman intimately for many years, having been his colleague first on the examination board, and again as Secretary to the Conference. The intimacy had been a most pleasurable one, and no one better than himself knew the immense amount of labour which Mr. Plowman had devoted to the Conference matters. This was more especially the case with regard to the Colonial and Indian business. When Mr. Plowman became Secretary, the Conference had only just begun to think of the Colonies and India as a field into which it might extend its labours, but through his indefatigable exertions it had now representatives and members in

all parts of India, and in all the Colonies throughout the world. This was a matter upon which the Conference might specially congratulate itself, and it should bear in mind that the result was chiefly due to the efforts of Mr. Plowman.

The resolution having been carried by acclamation,—

Mr. PLOWMAN said he had felt the continued success of the Conference for the last five meetings had been an ample reward to him for any efforts he had made on its behalf; but he wished to express his cordial thanks for the way in which the Conference had received the remarks of the President, and of his colleague, Dr. Thresh. With regard to the Colonial and Indian extension, he felt bound to state that the idea did not originate with him. He simply carried out the details of the work. He left office with an easy conscience, because there were already inscribed in the book at the door the names of 187 members who had attended the present meeting. This was the largest attendance recorded at any meeting in the history of the Conference, and he believed a considerable number had attended who had not yet subscribed their names. Thanking the President once more for the kind way in which he had proposed this resolution, he must say that he felt that the future success of the Conference was assured for many years to come, for he had perceived many indications which satisfied him on that point. It was with much regret, and only from the pressure of other work, that he felt himself compelled to resign his office.

Mr. J. B. STEPHENSON then moved—

“That the hearty thanks of the meeting be given to the President and Council of the Mason’s Science College for granting the Conference the use of the Chemical Lecture Theatre, and to Professor Tilden and Professor Hillhouse for their valuable assistance in promoting the success of the meeting.”

That lecture hall in which the Conference had held its meetings was most convenient, and, in fact, he did not think for appropriateness he had ever seen it equalled at any previous meeting of the Conference.

Mr. Moss seconded the motion. He said that all knew how much depended on the arrangements made for such a meeting, and on the present occasion these arrangements seemed to be almost typically perfect. He was glad, too, that the motion was

associated with the name of his old colleague and friend, Professor Tilden, who they all rejoiced to see holding a high position in such an important town.

The motion having been carried unanimously,

Mr. ALLEN (Dublin) proposed a vote of thanks to the manufacturers who had so kindly opened their factories for inspection in the following terms,—

“That the best thanks of the Conference be accorded to Messrs. Elkington & Co., Messrs. Heaton & Co., and Messrs. Gillott, for their kindness in allowing visiting members to inspect their works.”

Mr. MABEN seconded the motion.

The resolution was carried unanimously.

Mr. GROVES then moved—

“That the best thanks of the Conference be accorded to the President for the very able and courteous manner in which he has conducted the business of the meeting.”

He said there could be no doubt about the ability which Mr. Greenish had shown, and having himself occupied the same post, he could appreciate the amount of labour which was entailed in holding the office of President.

Mr. KEMP (Bombay) seconded the motion. He said the name of Mr. Greenish was known far beyond the limits of the United Kingdom, as one who had not only enriched the special science with which he was connected, but whose career was quoted as a brilliant instance of self-reliance and honourable success. As long as the Conference had a President who would preside over the meetings with the same kindness and dignity which Mr. Greenish had displayed, there could be no doubt of its success.

The resolution was put by Mr. GROVES and carried by acclamation.

The PRESIDENT, in responding, begged to thank Mr. Groves and Mr. Kemp for the very kind manner in which they had brought forward the resolution, and the members generally for the cordial manner in which it had been received. The Conference had been, of all the institutions connected with pharmacy, the one in which he had taken an especial interest for very many years. It had always been a pleasure to him to attend the meetings, and he had never attended a single Conference, from the first up to the present time, without deriving great benefit from it, and he certainly

would recommend all those who were present now for the first time to continue that attendance as long as the opportunity was afforded them. He was rather anxious about the success of this meeting at first, but was happy to think that his fears had been unfounded, and with regard to the ultimate success of the Conference he had not the slightest doubt. In fact he believed that year by year the Conference would increase, not only in members, but in usefulness, and in the character of the papers submitted to it. He was always glad to see a high class of paper, but not to the exclusion of pharmaceutical papers. There was still plenty of material to work upon, especially in those preparations the processes for which were by no means satisfactory.

THE CONVERSAZIONE AND RECEPTION.

At the suggestion of the Conference Executive, the Local Committee had arranged for a *Conversazione* and Reception to be held in the large room at the Grand Hotel, the head quarters of the Conference, to which all the members of the Conference were invited. At 9 p.m., Mr. Greenish, the President, supported by the Vice-Presidents and other Officers of the Conference, received the guests, amongst whom were Sir James Sawyer, M.D., Dr. Lawson Tait, Dr. Hill, Prof. Tilden, and other Birmingham gentlemen well known in the medical and scientific world.

A string quartette band and party of glee singers discoursed sweet music at frequent intervals during the evening, and in an adjoining room light refreshments were served.

The large number of local and visiting members who assembled spent a most agreeable evening. The success of the new departure was complete. For a long time it has been felt that it was desirable to promote, at the earliest possible moment, a friendly intercourse between the local and the visiting members of the Conference, that they might become known to each other before the actual business of the Conference commenced. For this end the Conference Committee had decided that, if possible, a *Conversazione* and Reception should be held on the evening preceding the General Meeting. The admirably organized efforts of the Birmingham Committee proved that such a gathering could be made most interesting, and that it fulfilled the object for which it had been instituted.

THE EXCURSION.

On Thursday morning, at 8.45, in miserably wet weather, over 160 members, their wives and other lady friends, met at Snowhill Station, from whence a special train conveyed them to Stratford-on-Avon, which was reached at 9.40. The local executive committee provided each member of the party with a copy of a guide-book drawn up by Mr. W. F. Wyley, vice-president of the Midland Counties Chemists' Association. The booklet contained brief descriptive and historical notes regarding the various places of interest which were visited during the day, and each one was illustrated by two cabinet-sized photographs. It proved, like many other of the Birmingham arrangements, exceedingly useful.

Proceeding from the station, the party arrived at Holy Trinity Church in time for the morning service, after which a thorough inspection of the many objects of interest was made. It was in this church that Shakespeare was baptised, and here his remains lie, facts which are attested by the Church register, which was shown to the visitors.

This church is one of the oldest ecclesiastical edifices in England. Lately it has undergone thorough restoration, and the interior is as substantial in appearance as it is interesting from numerous monumental erections within it. On the north side of the choir is placed the mural monument of Shakespeare, with his bust, under an arch, between two columns of black marble. The monument is believed to have been executed by Gerard Johnston, soon after the poet's death, and the bust is regarded as one of the most authentic likenesses of the bard. From the church the party proceeded to the house in which Shakespeare was born. This building is situated in Henley Street. It appears that there is no doubt of this house having been the property of the poet's father, from whose family it passed into other hands, and was used for trade purposes until, twenty-five years ago, it was purchased by public subscription. The upper part of the house is that which interests the visitor most; there, in the front room, Shakespeare was born. The room has been restored to its original condition, and signatures of illustrious men and women and unknown people cover the walls, ceiling, and the window-panes. The back room contains a fine portrait in oil of Shakespeare, of considerable age, and greatly resembling the likeness presented by the mural tablet. The house contains also in the rooms of the upper floor a museum of Shakespearian curiosities—rare editions of his works; amongst

the more notable objects were the only letter addressed to him which exists, and his chair. After a careful inspection of all that was to be seen, the party proceeded to the Memorial Theatre, and from thence to New Place, whereon once stood the house in which the poet lived during his later years, and in which he died. We may state that Mr. Hawkes, pharmaceutical chemist, Stratford, personally conducted the party. The excursion was continued at 12.45 p.m. by train to Leamington, and proceeded at once by the principal street to the Town Hall, where luncheon was served in most sumptuous style. Mr. Councillor Barclay presided, and was supported by several local medical men, and the principal pharmacists who attended the Conference. After luncheon and the loyal toasts, Mr. Atkins was called upon to propose "The Medical Profession." Dr. Wyer (Leamington) and Dr. Tibbets (Warwick) replied. Dr. Thorn (Leamington) proposed "The British Pharmaceutical Conference." Mr. Greenish replied, and thereafter Mr. Richard Reynolds proposed a hearty vote of thanks to the chemists of Leamington and district for their hospitality, and in doing so proposed the health of the Chairman, Mr. Smith (Leamington), Mr. Pullin (Leamington), Mr. Holiday (Warwick), and Mr. Charles Thompson, the honorary local secretary, who duly responded.

Leamington is famous for its Jephson Gardens, named after the celebrated Dr. Jephson, and situated in the centre of the town, on the north bank of the river Leam.

At three o'clock the party proceeded in cabs and other vehicles to Warwick Castle, and from thence to Kenilworth, where a thorough inspection of this famous ruin was made.

From Kenilworth the party returned, *via* Stoneleigh Park, to Leamington, and reached Birmingham shortly after 8 o'clock. In spite of the wretched weather, the excursion was most enjoyable, and the arrangements were perfect.

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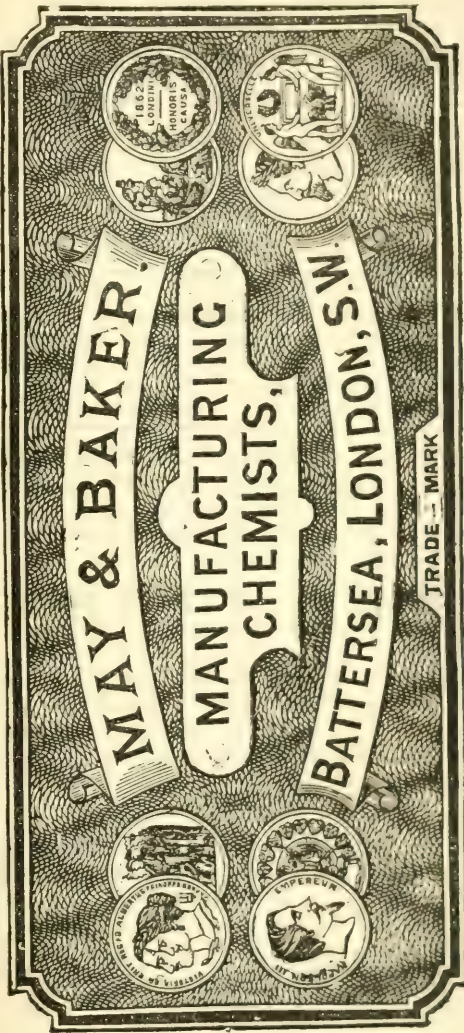
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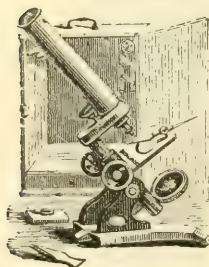
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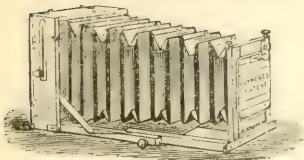
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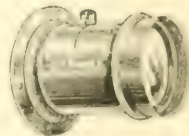
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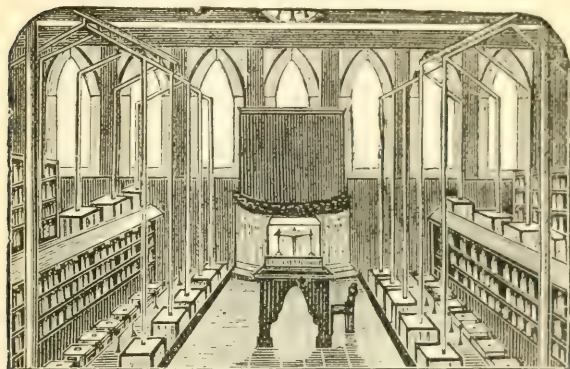
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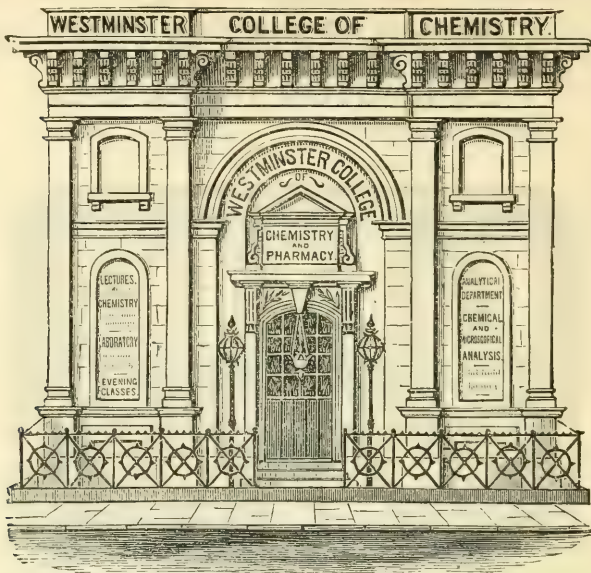
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Another fact may also be added, and that is that almost every one of the Students of this School comes through the recommendation of others who have been before and experienced the mode of teaching, so that lengthy advertisements or circulars are not used as a means of influencing candidates to prosecute their studies at this particular School.

The work of the Session is divided into three complete Courses of Lectures and Classes: one commencing on September 2nd and terminating at the December Examinations; another commencing the beginning of January and terminating at the April Examinations; and the third extending from April to the July Examinations.

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Two prizes are offered for competition to Students at the end of each course of five months:—1st Prize, Silver Medal; 2nd Prize, Bronze Medal. Certificates of Merit are also awarded to Students who have obtained a number of marks above the average. Certificates of attendance are granted to Students who work diligently for a term of three months.

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- 1.—No Student to be absent from the Laboratory or Classes during the hours of study without permission.
- 2.—No Conversation to be allowed during the Lectures.
- 3.—All Laboratory experiments causing noxious smells to be performed in the fume chamber provided for that purpose.
- 4.—The benches to be left clean and in order at the close of the Laboratory work.
- 5.—Smoking allowed in the Students' room only between Class hours.

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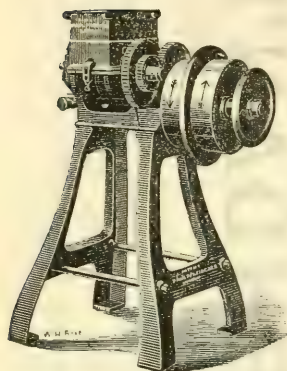


Fig. 97.

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Chemists.

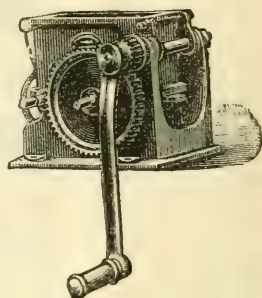


Fig. 130.

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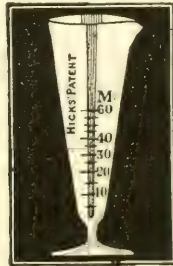
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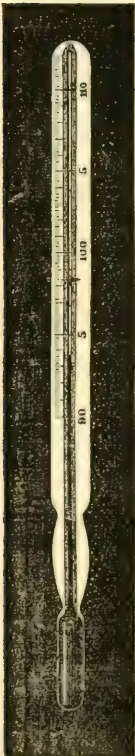


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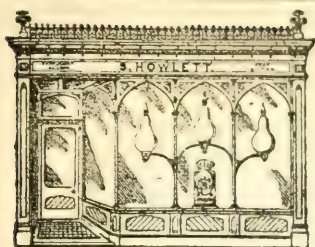
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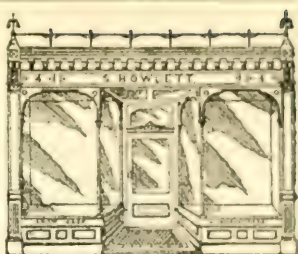
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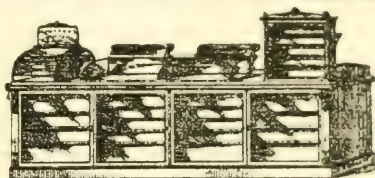
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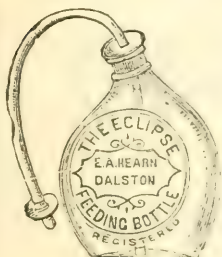
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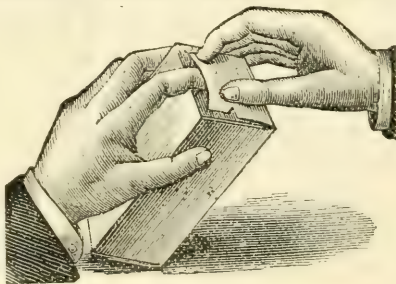
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The *Chemist and Druggist* says of it: “Messrs. Bourne, Johnson & Latimer have ‘compiled’ bundles of thin ‘curl’ papers into the form of a volume, showily bound, and entitled ‘Stray Leaves from Japanese Papers.’ The idea is a happy one, and the work is likely to be popular.”

It Retail at One Shilling, and is supplied wholesale at
8s. per doz.

10 PER CENT. DISCOUNT FOR CASH.

THE “PET” FEEDING BOTTLE.

No.			Per doz.
6.	Green glass, bent neck, white fittings	... ..	3 6
7.	“ “ black “	... ..	3 9
10.	“ screw glass stopper, white fittings	... ..	4 0
11.	“ “ black “	... ..	4 3
14.	White flint glass, china caps	... ..	7 6
17.	“ screw glass stoppers	... ..	8 0
19.	“ pure tin caps	... ..	8 0
20.	“ gilt metal caps	... ..	12 0
21.	“ gilt china caps	... ..	12 0
22.	“ glass screw stoppers	... ..	12 0

Nos. 6, 7, 10, and 11 are also supplied in boxes containing 1 gross at specially reduced prices.

BOURNE, JOHNSON & LATIMER

(Successors to BOURNE & TAYLOR, Est. 1850),

Wholesale and Export Druggists' Sundriesmen.

34 & 35, FURNIVAL STREET,
LONDON, E.C.



LETCHERS' Permanent!
 CONCENTRATED
 UNIFORM!
 ECONOMICAL! LIQUORS.

Any Quantity of a required Syrup at a moment's notice.

In Daily Use in Pharmacies and Dispensaries throughout the World.
 May be obtained through any Wholesale Drug or Patent Medicine House.

When Ordering, please Specify :—

Liq: Ferriciodidi (Fletcher) OR Liq: Ferric Iodide (Fletcher)

Fletcher, Fletcher, & Stevenson,
 North London Chemical Works, Holloway, London, N.

Extract. Cinchonæ Liq.

(De Vry.)

Ext. Cinchonæ Liq. (De Vry) is a TRUE LIQUEFIED CINCHONA BARK, containing fully five per cent. of alkaloids, and presenting in a permanently soluble form ALL THE COLLATERAL PRINCIPLES (*Cinchotannic Acid*, &c.) by which the medicinal properties of the alkaloids are well known to be enhanced. Being thus of definite strength, the DOSE of the Extract may be determined with SCIENTIFIC ACCURACY, and, by its use, Cinchona Bark may be administered with a PRECISION PREVIOUSLY UNKNOWN.

DOSE.—The ordinary tonic dose is ten minims, corresponding to ten grains of FINEST SELECTED RED CINCHONA BARK. As a *Feverifuge* and *Antiperiodic*, larger doses may be given at discretion. For *alcohol craving in inebriates*, and in the treatment of *delirium tremens*, full doses, to the extent of a drachm or more, should be given at short intervals, to be cautiously discontinued.

N.B.—*Alkalis and the alkaline carbonates are incompatible with this preparation.*
Ext. Cinchonæ Liq. (De Vry) may be obtained through any Wholesale House, or direct from us, at the following rates:—

½-lb. bots., 3 6; ¼-lb. bots., 6 6; 1-lb. bots., 12 6 each.

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MIST. PEPSINÆ Co. c. BISMUTHO,

A USEFUL COMPOUND, CONTAINING

Pepsine, Nux Vomica, Opium, Hydrocyanic Acid, Chloric Æther, and Bismuth, &c.
DOSE.—*Half to One dram diluted.*

"Provident Dispensary, 15, Stanhope Street, Newcastle-on-Tyne,
March 7th, 1880.

SIR,

I must thank you for having put me in possession of a most useful and elegant preparation, in the shape of your Mist. Pepsinæ Co. c. Bismutho.

In that most extensive class of cases met with in general practice, including Dyspepsia, Gastrodynia, Pyrosis, etc., I know of no remedy which acts so readily and efficiently as the above preparation. Another, by no means slight advantage in your happy combination, is the rapidity with which it can be dispensed, and its solubility in various media.

I am convinced that it only requires to be known to be extensively used.

Yours truly,

JOHN H. M. GALLWEY, M.R.C.S.E.

Prepared only by C. J. HEWLETT & SON, Manufacturing and Pharmaceutical
Chemists, 40, 41, & 42, Charlotte Street, Great Eastern Street, London, E.C.

THE PERFECT SURGICAL BANDAGE.

Preferred to all Makes hitherto used.

In Cases of Twelve Six-yard Rolls, 2 inches wide, 3s. 9d.; 2½-inch, 4s. 6d.; 3-inch, 5s. 6d.;
or, Case containing Twelve Six-yard Rolls of each width, 13s.

Free by post, to any address in the United Kingdom, for prepaid orders only.

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METHYLENE

Obtained by the action of Metallic Zinc on Chloroform & Alcohol.
Discovered to be a general anæsthetic by Dr. RICHARDSON in 1867.
In 1 lb. Bottles, 16s.; 8 oz., 8s. 6d.; 4 oz., 4s. 6d.; 2 oz., 2s. 6d.

COMPOUND ANÆSTHETIC ETHER.

For producing local Anæsthesia.
In 4 oz., 10 oz., and 20 oz. Stoppered Bottles, 2s., 4s., and 7s.

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PEROXIDE OF HYDROGEN.

First introduced as a Medicine by Dr. RICHARDSON.

ETHYLATE OF SODIUM.

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For promoting the Healing of Wounds by the first intention.
In 2 oz. and 4 oz. Bottles, with Brush, 2s. 6d.
and 4s. 6d.; 16 oz. 12s.

CHARCOAL CAPSULES.

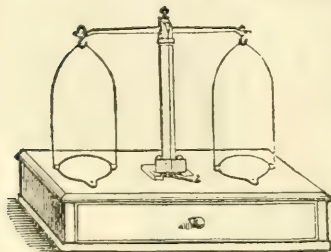
Containing pure Vegetable Ivory Charcoal.
In Boxes, 2s. 6d.

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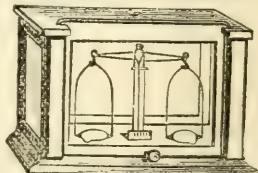
W. STONE'S DISPENSING & ANALYTICAL BALANCES, HELIOGRAPH MAKER,

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No. 1. Box
Balance,
35s.

No. 1a, in
Case,
63s.



This Balance was strongly recommended by
Professor Redwood.—See *Pharmaceutical Journal*,
April 9th, 1881.



COX'S TASTELESS PILLS.

BY ROYAL LETTERS PATENT.

DATED AND SEALED APRIL 13TH, 1854.

Surgeons and Chemists supplied with an excellent Aperient Pill (the formulæ for which will be forwarded), covered with a thin, non-metallic film, rendering each Pill perfectly tasteless, at 1s. a gross. Postage free.

Any formulæ dispensed and covered, and samples, with list of Pills, from over 600 different forms, which are kept in stock, will be forwarded free on application.

They were introduced to the medical profession by the present proprietors more than thirty years ago, and many thousands of unsolicited testimonials have been received from the highest medical authorities, and are now used, and have been used for many years past, by the largest and best conducted hospitals and dispensaries. Of course a success like this has led to many imitations, and highly varnished pills, made to resemble ours, have been introduced by some unscrupulous people. Many of these pills pass through the stomach unaltered, and a useful invention is thus likely to be brought into disrepute.

The most impudent assertions are made by some who combine in one incongruous whole, the trades of druggists' sundrymen, retail druggists, soap-makers, and horse and cattle medicine vendors.

We make and sell nothing but pills, and have testimonials from regular customers, residing in China, Australia, and every part of the civilized world, as well as from friends in almost every town and village in the kingdom; and our trade, which is constantly increasing, is perhaps four or five times as large as all the rest of our copyists put together.

The following are some of our Prices FOR CHEMISTS ONLY:

We strongly recommend our Aperient Pills, as a good general saleable Pill. These, with the Pharmacopœia Pills quoted below, are sent out to every part of the United Kingdom in half-pound parcels, package, postage, and carriage free, on the same day as the order is received; and, to avoid booking and other expenses, 1d. in the shilling will be allowed if stamps or P.O.O. are remitted with order.

Any Pills can also be obtained from any Wholesale Druggist. In ordering, please specify "Cox's TASTELESS PILLS."

QUOTATIONS FOR OTHER PILLS ON APPLICATION.

No. in Catalogue.	Pil. Aperients et Cathartic.	Prices per Pound in Four or Five Grain Pills.		No. in Catalogue.	Pills of the British Pharmacopœia.	Prices per Pound in Four or Five Grain Pills.	
		Coated.	Un-coated.			Coated.	Un-coated.
1 & 2	Pil. Aper (Cox) c. Cal.	6/-	5/-	122	Pil. Assafœtidæ Co.	6/-	5/-
3 & 4	" " (Cox) sine Cal.	6/-	5/-	66	" Cambog. Co. . .	6/-	5/-
193	" Cathartic Fort. (Cox) . .	6/-	5/-	24	" Coloc. Co. . .	13/-	12/-
332	" Cochia . . .	5/-	4/-	30	" " et Hyos. . .	12/-	11/-
				62	" Ferri Carb. . .	5/-	4/-
				71	" Hydrarg. . .	5/-	4/-
				92	" " Sub-		
					" chlor Co. . .	6/-	5/-
	PILLS OF THE BRITISH PHARMACOPŒIA.			77	" Ipecac. c. Scilla	6/-	5/-
6	Pil. Aloes. Barb. . .	5/-	4/-	99	" Plumbi. c. Opio.	11/-	10/-
8	" " et Assafœtidæ . .	5/-	4/-	104	" Rhei Co. . .	6/-	5/-
9	" " et Ferri . .	5/-	4/-	119	" Saponis Co. . .	12/-	11/-
10	" " et Myrrh . .	12/-	11/-	115	" Scilla Co. . .	5/-	4/-
7	" " Soc. . .	6/-	5/-				

The Registrar of Trade Marks (after giving the usual public notice, prescribed by Parliament, to allow of opposition) has granted us the above "Trade Mark," thus officially recognizing us as the "Original Makers of Tasteless Pills," and no Pills will be sent out without this Mark on all bottles or packages.

ARTHUR H. COX & CO.,
Tasteless Pill Manufacturers.
ST. MARTIN'S PLACE, BRIGHTON.

Telegraphic Address: "HUBBUCK," LONDON.

HUBBUCK'S PURE OXIDE OF ZINC.

PHARMACEUTICAL CHEMISTS will use this in preference to the ZINCI OXIDUM of the Br. Ph. 1867, which is a return to the process of the Pharmacopœia of 1836, being a roasted carbonate as a substitute for the pure Oxide.

HUBBUCK'S PURE OXIDE is made by sublimation, and is warranted to contain upwards of 99 per cent. of Pure Oxide; in fact, the impurities are not traceable.

*Extract from "Pharmaceutical Journal" of May 1, 1856,
page 486.*

TRANSACTIONS OF THE PHARMACEUTICAL SOCIETY OF LONDON.
Wednesday, April 2nd, 1856.

"On Pure Oxide of Zinc for Use in Medicine.

"Mr. **Redwood** directed the attention of the meeting to the very beautiful specimen of oxide of zinc on the table, which had been presented by the manufacturer, Mr. **Hubbuck**. Some of this oxide had been submitted to him for chemical examination, and finding it to be remarkably pure, and to possess in a high degree all the chemical and physical qualities required in oxide of zinc intended for use in medicine, he had suggested to Mr. **Hubbuck** that it might be brought under the notice of the Society.

"The specimen of oxide of zinc on the table was not only free from all impurities, but it possessed the other qualities required. It was a perfectly white, light, and smooth powder.

"Mr. **HUBBUCK** stated that the oxide of zinc which his firm made for use in medicine was free from impurities commonly occurring in the oxide made by combustion. The zinc was first thoroughly refined, and all the lead, arsenic, cadmium, iron, and other impurities removed. The pure oxide was then produced by combustion, abstracting only the very finest part of the product for medicinal purposes. About one-tenth or one-twelfth of the whole was thus set apart in producing that from which the sample exhibited had been taken; and this could be done, since their usual operations requiring them to make several tons of oxide every day, they could separate as much as was required in a state of absolute purity, while the remainder would be equally valuable as a pigment.

"The **CHAIRMAN** thought the mechanical condition of substances used in medicine was often a matter of considerable importance, and ought to be considered as well as their chemical composition. He thought the specimen before the meeting was a very perfect one in every respect, and he had no doubt it was the sort of oxide of zinc best adapted for use in medicine."

Sold by the following Wholesale Druggists, in Stamped Boxes of 7 and 14 lbs.:-

Adams, R. F. & J.	Evans, Sons & Co.	Hunt Bros.
Allen & Hanbury.	Ferris, Bourne & Co.	Huskisson, H. O., & Co.
Baiss Brothers & Co.	Gabriel & Troke.	Johnson & Sons.
Barron, Harveys & Simpson.	Gale & Co.	Lofthouse & Saltmer.
Barron, Squire & Co.	Glasgow Apothecaries' Co.	Mackay, John, & Co.
Battley & Watts.	Harker, Stagg & Moss.	Oldfield, Pattison & Co.
Burgess, Willows & Francis.	Hatrich, W. R., & Co.	Reynolds & Bransom.
Burgoyne, Burbidges & Co.	Hearon, Squire & Francis.	Southall Brothers & Barclay.
Clark & Pinkerton.	Herrings & Co.	Sumner, R., & Co.
Clarke, Bleasdale & Co.	Hewlett, C. J., & Son.	Taylor, James.
Clay, Dod & Case.	Hill, A. S., & Son.	Thompson, H. A., & Son.
Corbyn, Stacey & Co.	Hodgkinson, Preston & King.	Warren, A. & J.
Davey, Yates & Routledge.	Hodgkinsons, Stead & Treacher.	Woolley, James, Sons & Co.
Duncan, Flockhart & Co.	Horner & Sons.	Wright, Layman & Umney.
Evans, Lescher & Evans.		Wyleys & Brown.
		Wyman & Westwood.

The Manufacturers supply, Wholesale only, in quantities of not less than a Quarter of a Ton.

HUBBUCK & SON, 24, LIME STREET, LONDON.

THE GOLD MEDAL
OF THE
INTERNATIONAL HEALTH EXHIBITION, LONDON,
HAS BEEN AWARDED FOR
BENGER'S PREPARATIONS.

"Mr. Benger's admirable preparations."—*The Lancet*, March, 25, 1882.

LIQUOR PANCREATICUS (BENGER). Containing the active digestive principles of the fresh Pancreas. Used for the preparation of Peptonised or partially digested Foods. No apparatus beyond a jug and saucepan required. Bottles, 2/6, 4/6, and 8/6, with full directions for use.

LIQUOR PEPTICUS (BENGER). A concentrated fluid pepsine of remarkable activity. Bottles, 3/4, 5/6, and 10/6.

BENGER'S PEPTONISED BEEF JELLY. A delicately flavoured concentrated and solidified beef tea. A delicious, quick restorative. Tins, 2/-. Will keep in any climate.

BENGER'S SELF-DIGESTIVE FOOD, for Infants, Children, and Invalids. An improvement on Liebig's Food. Impregnated with the natural digestive principles of the Pancreas instead of Malt, these act on the milk with which it is mixed in use, as well as on the starchy matter. It can be taken with comfort when all other foods disagree. Tins, 1/6, 2/6, and 5/-.

Benger's Preparations can be obtained through all Wholesale Houses, or direct from the Manufacturers,

MOTTERSHEAD & CO., (S. PAINE and
F. B. BENGER.)

PHARMACEUTICAL CHEMISTS,

7, EXCHANGE STREET, MANCHESTER.

BULLOCK'S PEPSINA PORCI.

Dose—2 to 4 grains.

Messrs. BULLOCK & Co., beg to direct attention to an article by G. F. DOWDESWELL, Esq., B.A. (Cantab.), F.C.S., F.L.S., &c., on "Medicinal Pepsine and Artificial Digestion," which appeared in the *Practitioner* for March, 1880. In this paper Mr. DOWDESWELL gives the results of upwards of 200 experiments, which conclusively demonstrated the marked superiority of BULLOCK'S PEPSINA PORCI AND ACID GLYCERINE OF PEPSINE over every other Pepsine or preparation of Pepsine—ENGLISH, FRENCH, GERMAN, OR AMERICAN; and confirmed the equally favourable reports of Dr. PAVY (1863), Professor TUSON (1870), and the late Professor GARROD (1878), as to the pre-eminent value of BULLOCK'S PEPSINA PORCI. It may be added that many Pepsines and their preparations are inert.

BULLOCK'S ACID GLYCERINE OF PEPSINE.

Dose—I to 2 drachms.

Possesses at least three times the digestive power (and in most cases considerably more) than any other preparation of Pepsine and Glycerine, or fluid form of Pepsine whatever.

May be prescribed with most substances compatible with acids. In 4-oz., 8-oz., and 16-oz. bottles, and in bulk.

* * In prescribing either of the above preparations, it is suggested to insert in parentheses as follows (BULLOCK).

**J. L. BULLOCK & CO., 3, Hanover Street, Hanover
Square, LONDON, W.**

SYR. HYPOPHOS. CO., FELLOWS.

CONTAINS THE ESSENTIAL ELEMENTS to the Animal Organization
—Potash and Lime;

THE OXIDISING AGENTS—Iron and Manganese;

THE TONICS—Quinine and Strychnine;

AND THE VITALISING CONSTITUENTS—Phosphorus, combined in the form of Syrup with SLIGHT ALKALINE REACTION.

IT DIFFERS IN EFFECT FROM ALL OTHERS, being highly susceptible to oxidation during respiration, pleasant to taste, acceptable to the stomach, and harmless under prolonged use.

IT HAS SUSTAINED A HIGH REPUTATION, particularly in the treatment of Pulmonary Tuberculosis, Chronic Bronchitis, and other affections of the respiratory organs. Is employed also in various nervous and debilitating diseases with success.

ITS CURATIVE PROPERTIES are largely attributable to Stimulant, Tonic and Nutritive Qualities, whereby the various organs are recruited.

ITS ACTION IS PROMPT, stimulating the appetite and the digestion; it promotes assimilation, and enters directly into the circulation with food products.

The prescribed dose produces a feeling of buoyancy, and removes depression and melancholy; hence it is of great value in the treatment of mental and nervous affections. From its exerting a double tonic effect, and influencing a healthy flow of the secretions, its use is indicated in a wide range of diseases.

NOTICE—CAUTION.—The success of Fellows' Hypophosphites has prompted certain persons to utter substitutes. Mr. Fellows, having examined several of these, finds no two samples identical, and all differ from the veritable, in composition, in freedom from acid reaction, in susceptibility to the effects of oxygen when exposed to light or heat, in the property of retaining the strychnine in solution, and in the medicinal effects.

SPECIAL NOTICE.

Lest any Members of the Medical Profession may be misled by the many specious advertisements of imitators of Fellows' Syrup of Hypophosphites, Mr. Fellows begs to publish the following, viz.—

That he is the sole inventor of the formula of Fellows' Compound Syrup of Hypophosphites, which was discovered and prepared for the first time for his own use in 1865, when out of health;

That the testimonials bear date from the year 1868;

That the genuineness of the early testimonials was certified by Aaron Alward, Esq., M.D., Mayor of the City of St. John, Province of New Brunswick, Canada, and the great seal attached on 6th February, 1868; and

That the formula of the Syrup has never since been changed.

Mr. Fellows therefore refers to the printed form surrounding every bottle, where the letters may be found in detail.

As cheap substitutes are frequently dispensed instead of the genuine, Mr. Fellows can only advise that his Syrup should be prescribed in the original bottles, 4s. or 7s., where the distinguishing marks will prevent imposition.

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BURROUGHS, WELLCOME & CO.,
Snow-hill Buildings, London, E.C.

Chemical Food, or Parrish's Syrup.

Each teaspoonful contains 2 grains of Phosphate of Iron and Lime, with smaller proportions of the Alkaline Phosphates all in perfect solution. One or two teaspoonfuls at mealtime.

Syrup of Biphosphate of Iron and Manganese.

Syrup of Biphosphate of Iron.

Syrup of Biphosphate of Lime.

Syrup of Biphosphate of Zinc.

Syrup of Hypophosphite of Iron, Quinine, and Strychnine.

Syrup of the Superphosphate of Iron, Quinine, and Strychnine.

Syrup of Hypophosphite of Iron.

Syrup of Hypophosphite of Lime.

Syrup of Hypophosphite of Soda.

Compound Syrup of Hypophosphite of Iron and Lime.

Syrup of Pyrophosphate of Iron.

Syrup of Bromide of Iron.

Syrup of Iodide of Quinine.

Syrup of Iodide of Iron and Quinine.

Syrup of Peracetate of Iron and Quinine.

Solution of Peracetate of Iron.

Do. Glacial.

Clinical experience has proved that this preparation contains Iron in the most assimilable form.

Solution of Peracetate of Iron and Quinine.

COD LIVER OLEIN.

This preparation is prepared from the finest Newfoundland Oil, containing all the active principles, without its impurities, and will be found to agree with the most delicate stomachs.

Phosphorised Cod Liver Olein.

Cod Liver Oil with Quinine.

Cod Liver Oil with Iodide of Iron.

Cod Liver Oil with Bromide of Iron.

SYRUP OF HYPOPHOSPHITE OF IRON AND QUININE.

This preparation has been successfully given in Hysteria, Epilepsy, Spermatorrhoea, and other exhaustive derangements of the Nervous System.

DIALYSED IRON.—Dose, 10 to 30 minims in water.

Proprietors of the City of London Cough Lozenges and Pills, Toothache Annihilator, No More Corns (all Registered), and Antiseptic Saline.

Application for the Marvellous Removal of Corns.

BREWER & MARSTON, Pharmaceutical and Operative Chemists,
105, LATE 99, LONDON WALL, E.C.

PURE SPIRITS OF WINE.

To Wholesale Druggists, Chemists, Perfumers, &c.

We are now supplying *Sp. Vin. Rect.*, fine qualities, at a very low figure for cash; free from smell, and perfectly clean. Also in bond for exportation.

METHYLATED SPIRIT AND FINISH, 64 O. P.

We are selling the above at the lowest possible cash price of the day, in quantities of Five Gallons and upwards. Quotations upon application.

CATALONIAN SHERRY, 7s. 6d. per gallon (Nett).

A good sound wine, combining body and strength, and specially adapted for medicinal wines and other purposes.

ORANGE WINE, Finest Quality;

Guaranteed not to cause a deposit or become opaque by the addition of quinine. 5s. 9d. per gallon, nett cash. Second Quality, 4s. 9d. nett.

OUR CELEBRATED PURE SPIRITS OF WINE

Is used by all the principal Wholesale Druggists, Pharmacists, and Perfumers in town and country. It is allowed to be the best article for making Tinctures, Essences, and the most delicate Perfumes, being perfectly free from smell and fusel oil.

Packages to be paid for, and allowed upon return.

E. BOWERBANK & SONS,

The BISHOPSGATE DISTILLERY, Sun Street, London.

Also at DUNNING'S ALLEY.

N.B.—No connection with the House styled Bishopsgate Distillery and Wine Company.

ESTABLISHED 1782.

Drugs,
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Chemicals, and
Preparations.

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PRICES CURRENT ON APPLICATION.

J. F. MACFARLAN & CO.,
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HAVE OBTAINED MEDALS AT VARIOUS INTERNATIONAL
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THESE COMPRISE :

MORPHIA AND ITS SALTS.

Codeia and other Opium products.

Amyl Nitrate and Nitrite.

Sulphate of Berberine.

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PURE CHLOROFORM.

Chrysophanic Acid.

Anæsthetic Ether.

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Salicin.

Also the Antiseptic Dressings and Appliances used in the Listerian System of Surgery, prepared according to the Special Formulæ of PROFESSOR SIR JOSEPH LISTER.

17, NORTH BRIDGE, EDINBURGH;
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71, COLEMAN STREET, LONDON, E.C.

Medals—Cape Town (Silver), 1877; Brighton Health Exhibition, 1881; Cork Exhibition, 1883; Dublin Sanitary Exhibition, 1884; International Health Exhibition (Gold), 1884; International Inventions Exhibition, 1885.

IMPROVEMENTS IN PHARMACY,

Extensively Prescribed by the Medical Profession.

QUINQUININE, MACKEYS' (Registered).

The pure Alkaloids of the official Cinchona Barks; largely used in Hospital and private practice with great success. Takes the place of Quinine at considerably less price. *Every genuine bottle has the name Mackey.*

TESTIMONIAL.—"Therapeutically, MACKEY'S QUINQUININE equals SULPHATE OF QUININE. It is a certain tonic, and a sheet-anchor in cases where fever remits or intermits."—THOS. HORSER, L.R.C.P., Sandwich.

MACKEYS' NEW SOLUBLE NEUTRAL PREPARATIONS OF CERIUM.

(Protected by Letters Patent.)

Liquor Cerii. Sedative-Tonic. 3j. is equivalent to gr. ij. Cerii Oxalat. In bottles, 5s. & 9s.
Liq. Cerii cum Pepsinâ. Tonic-Digestive. 3j. is equivalent to gr. ij. Cerii Oxalat and gr. ij. Pepsinâ. In bottles, 5s. and 9s.

Mistura Cerii Composita. Tonic, Stomachic and Anti-Dyspeptic. 3j. is equivalent to Cerii Am. Citrat. gr. vi.; Tinct. Nux Vomica, mxx.; Acid. Hydrocyanic, P.B., max.; Spt. Chloroform, mxx. In bottles, 5s. and 9s.

"I have found MISTURA CERII Co. allay vomiting (no matter what cause) when all other remedies have failed."—R. T. W. SMITH, F.R.C.S., etc.

MACKEYS' MIST. BISMUTHI COMP. (Registered). Tonic Digestive.

A valuable medicine for various forms of Indigestion and any disorder of the stomach, having a direct action upon the incoercible membrane as a sedative.

"I have found MACKEYS' MISTURA BISMUTHI COMP. most efficacious, and far superior to any other preparation of Bismuth that has come under my notice."—C. EATON BAKER, M.R.C.S., etc.

NEW SOLUBLE TRANSPARENT AND PEARL-COATED PILLS.

of the Pharmacopœias and Private Formulae, as required.

These pills possess numerous advantages over the Pills of other makers—*They never crack or split. The coating does not peel off. They are moderate in price. The ingredients are carefully selected, and of the best quality. The coating, which dissolves in about half a minute, is put on while the mass is soft, thus keeping the Pill in a perfect soluble condition. It is unimpaired by age, it is quite transparent, and the taste of the Pill is perfectly covered. The excipients chosen tend to preserve the soluble character of the Pill, and increase the medicinal effect of the drug.*

MACKEYS' LIQUOR SANTAL CUM COPAIBA, CUBEBA, ET BUCHU.

When the disease is chronic, "the Liquor Santal acts like a charm." 8s. per lb. Dose 1 to 2 drachms.

MACKEYS' CHLORODYNE. Pink and Brown.

Anodyne, astringent, antispasmodic, diaphoretic, sedative, in perfect combination, is miscible with water in all proportions, does not separate, and is most convenient for dispensing. 5s. per lb.

Dr. M. BROWN writes:—"I and my people like your CHLORODYNE very much; it is far superior to any other maker's."

A Liberal Discount to the Trade on the above Preparations.

List of SPECIAL ANTISEPTICS, DISINFECTANTS, and DEODORISERS.

KRESYLIN, a Preparation of Coal Tar Creasote. A powerful Disinfectant for use in Drains, Water-closets, Urinals, etc. Non-poisonous, does not stain, and is not corrosive.

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CAMPHENE, a Terpene with Camphor, for disinfecting the atmosphere, Womans, Mothers and Surgical Dressings, and general Deodoriser.

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LIQUID SULPHUR GAS, a Solution of Sulphurous Anhydride. One vol. contains 100 vols. of Anhydride.

CARBOLIC ACID, **CRESYLIC ACID**, prepared from Coal Tar. A powerful Disinfectant, possessing Antiseptic properties superior to Carbolic Acid, for purifying Drains, Water Closets, Urinals, Asphalte Stables, etc.

KRESYLIN POWDER, Disinfectant for use in Drains, Water Closets, Urinals, etc. See above.

EUCALYPTOL POWDER, WITH SULPHATE OF COPPER, unequalled in Infectious Diseases.

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CHLOROMANGANEESE, a powder prepared from Permanganate of Lime and Chlorine. Superior to all other disinfectants for mixing with substances which cannot be disinfected with liquids, for Cattle Trunks, Cattle Stalls, Cow Stalls, etc.

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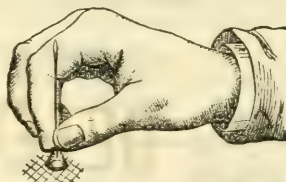
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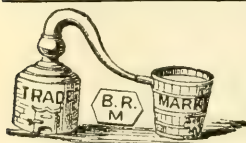
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Also makers of Finest Pale BBB, BB and BL Soft Soaps, in firkins and half firkins; the 10 per cent. Carbolic Acid Soft Soap in tins and firkins; and the PB Sapo Mollis, in all sized packages.

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IN publishing their present Price Current, tender their best thanks for the favours received for a period of thirty-seven years.

During which time, by the patterns registered and processes patented, namely, the White Enamelled Cement, the Machinery applied, the New Machines and Processes invented, &c., they believe they have taken the lead in improving the Manufacture of Tooth Brushes more than all the other Tooth Brush makers in the world put together, whose main efforts seem to have been that of trying to imitate the style and pattern of COATE & Co., but with very imperfect success as yet.

For, as a true test of the superiority of their manufacture, COATE & Co. can say that at the present moment their customers are now supplying most of the crowned heads, princes, and Nobles of Europe with Tooth Brushes made by COATE & Co.

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The drawing of each pattern signifies actual size and shape, not hardness, except the patterns G H (Goat Hair), V S (Very Soft), V H (Very Hard), Y, for Yellow or Unbleached Hair, and B H (Badger Hair). All the other patterns are made and sent out in Soft, Medium, and Hard, assorted, unless ordered to the contrary.

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Common Cemented	2 0	Cemented, Superfine, stamped with	...	5 0
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Cemented Warranted	4 0	Warranted Best Hair, stamped with
Cemented Warranted Extra	4 6	Trade Mark	...	6 0
				Extra Best, stamped with Trade Mark
				and "Coate & Co.," London.	...	6 6

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N.B.—A Large Stock of Finished TOOTH BRUSHES, HAIR BRUSHES, etc., kept ready for Merchants' Shipping Orders.

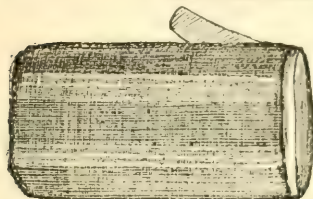
DINNEFORD & CO.,

MANUFACTURERS OF

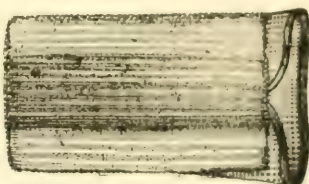
Horse-Hair Friction Gloves, Belts, Bath Brushes, Oxford and Cambridge Pads, etc., etc.

In white, grey, and black hair, of various degrees of hardness, to suit the most delicate, without risk of injury to the skin.

WHOLESALE PRICE LIST.



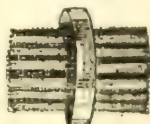
LADY'S AND GENT'S FLESH GLOVE (in Pairs).
No. 1 size, 36s.; No. 2, 40s.; No. 3, 42s.
per doz. pairs. Retail, 5s. each.



PRINCE OF WALES BATH GLOVE,
For wet or dry use. 21s. per doz. Retail, 2s. 6d. each.



CLARENDON FLESH RUBBER.
Hair on both sides. One surface is soft, the other hard; either may be used for friction.
24s. per doz. Retail, 3s. 6d. each.



ARMY BATH PAD.
For wet or dry use. Hair on both sides.
A luxury for the Bath. 12s. per doz. Retail, 2s. each.

OXFORD WASHING PAD.

For cleaning and softening the hands, and for the bath. In 1 doz. boxes; 8s. per doz. Retail 1s. each.

ALEXANDRA BATH BRUSH.

Hair on both sides, on a long handle. 24s. per doz. Retail, 2s. 6d. each.

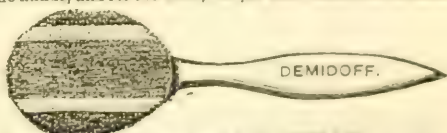


CAMBRIDGE PAD.

Hair on both sides; for softening the hands, and for the Bath, 12s. per doz. Retail, 1s. 6d. each.

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42s. per doz. Retail, 5s. each.



FLESH STRAP OR BELT, AND BATH STRAP.

LADIES' quality, light hair and soft pile. GENT'S quality, black or grey, and pile of various degrees of hardness. 42s. per doz. Retail, 5s. each.

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Prepared only by WILLIAM DARLING, Chemist, Manchester.

May be had from S. MAW, SON & THOMPSON; BARCLAY & SONS;
F. NEWBERRY & SONS; SANGER & SONS; and any Wholesale House in London.

Price 2s. per box, and family jars, 10s. each

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(Registered)

Is entirely different from any article of the kind, very much liked by customers,
a most effectual dentifrice, and handsomely put up in large jars.

ONE SHILLING EACH. Wholesale of all Patent Houses.

Liberal discount to large buyers.

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For Silver and Electro Plate.
6d. and 1s.

F. EWBANK (Plate Powder Manufacturer),
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AS USED IN ALL THE GOVERNMENT MUSEUMS.

Suited for any substance, from
glass and china to leather,
wood, or iron, and the articles
joined bear washing in boiling
water.

The large range of materials to which this cement is applicable, its transparency, strength,
and facility in use, and the readiness with which it adheres, renders it without doubt, THE
MOST USEFUL EVER INVENTED. It is equally applicable to articles of the coarsest
or the most delicate construction.

The great success which attended its introduction, now more than 20 years ago, has given
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celebrated Cement is uniformly prepared and neatly put up, and is guaranteed to remain
unchanged in any climate.

Professor ARCHER, Edinburgh.—“I have invariably found yours superior to all others, and
have extensively recommended its use to all my friends.”

Sold in Bottles at 6d. and 1s. (equal to 3 of the small).

FOULKES' TOILET & NURSERY POWDER.

IMPALPABLE AND
DELICATELY PERFUMED.

This unique Powder possesses
the emollient properties of ful-
ler's earth, free from colour, and
in a high condition of purity.

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E. H. THIELLAY'S EAU FONTAINE DE JOUVENCE, GOLDEN; OR, GOLDEN HAIR FLUID,

For rapidly changing Dark Hair into Flaxen or Sunny Shades.

N.B.—This article is now put up in round bottles, instead of flat squares; the glass is extremely strong, hermetically stoppered (Patent), and calculated to resist the strongest possible pressure of the liquid when in hot climates.

There are only three sizes issued at present, namely—

Contents	63 grammes,	125 grammes,	250 grammes.
Price	3/6	6/-	10/6 per bottle.
Wholesale	21/-	36/-	63/- per dozen.

The Contents being respectively $\frac{1}{16}$, $\frac{1}{8}$, $\frac{1}{4}$, of a litre.

Subject to quantitative discount.

ALSO

EAU FONTAINE DE JOUVENCE IN EVERY SHADE.

AUBURN.

DARK.

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BLACK.

PROGRESSIVE.

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WHOLESALE DESCRIPTIVE PRICE LIST ON APPLICATION.

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BONDED WAREHOUSE AT RED LION WHARF.

Shippers and Merchants supplied on the usual Terms, and at a considerable reduction for export in Bond.

AMERICAN BAY RUM,

IMPORTED AND INTRODUCED BY

MICHAEL E. FOSTER,

50, BISHOPSGATE WITHIN, LONDON, E.C.

Retail	...	...	1s. 6d.	Wholesale	...	...	12s. per doz.
"	...	...	2s. 6d.	"	...	...	20s. "
"	...	...	6s. 0d.	"	...	...	50s. "

N.B.—To Shippers and others requiring it in Bond, M. E. F. will be happy to forward Special Quotations.

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A.S. LLOYD'S EUXESIS,

FOR SHAVING WITHOUT SOAP, WATER, OR BRUSH.

The GENUINE Euxesis bears the following distinctive marks:—

- 1.—The Name **AIMÉE LLOYD** on cap of tube.
- 2.—The words "Prepared only by his Widow," and my signature of **AIMÉE LLOYD**, in **RED INK** across labels.

Manufactured only by AIMÉE LLOYD,

WIDOW OF A. S. LLOYD, formerly of 27, GLASSHOUSE STREET,
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GOLD MEDALS: HEALTH EXHIBITION, 1884.

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RIMMEL'S AROMATIC OZONIZER, a fragrant powder which, simply spread on a plate in apartments or places of public resort, evolves the refreshing and healthy emanations of the Pine and Eucalyptus, and produces a quantity of *Ozone*, the great air purifier. Its clean and portable nature renders it far preferable to liquid disinfectants. In 4 oz. Tins, 1s.; 1 lb Tins, 3s. 6d.; Spreading Plate, 6d.

RIMMEL'S OZONIZED EAU DE COLOGNE, LAVENDER, EUCALYPTUS, or FLORIDA WATER sprinkled on a pad hung up in the air, destroys bad smells and

noxious effluvia in sick rooms, closets, etc. Price 2s. 6d. and 5s. per Bottle; Pad, 1s.

RIMMEL'S AROMATIC OZONIZED POCKET CASSOLETTES, preserves from infection; metal, 6d.; plated, 1s.; by post for 1d. extra.

N.B.—500 detailed prospectuses, containing certificates and testimonials, sent with name and address to every purchaser of 3 dozen Aromatic Ozonizer, 1s. size.

SOLD BY ALL CHEMISTS AND DRUGGISTS. THE USUAL ALLOWANCE TO THE TRADE.

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NO CHARGE FOR CONSULTATION. MODERATE FEES.

Discount to Members of the Medical Profession.

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WOODS' ARECA NUT TOOTH PASTE,

For Removing Tartar, Whitening the Teeth, and Sweetening the Breath.

PRICE, 6d. and 1s. per Pot.

MAY BE HAD OF WHOLESALE HOUSES THROUGHOUT THE GLOBE.

ONCE USED ALWAYS USED.

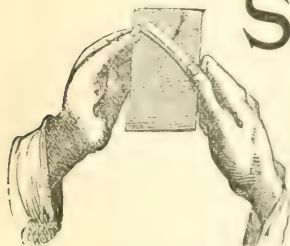
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Celebrated for upwards of 40 years for preserving uninterruptedly a keen edge to razors, absolutely without trouble.

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Fish Napkins, 2s. 11d. per dozen. Dinner Napkins, 5s. 6d. per dozen. Table Cloths, two yards square, 2s. 11½d.; two and a half by three yards, 5s. 11d.; Kitchen Table Cloths, 11½d. each.

Real Irish Linen Sheetings, fully bleached, two yards wide, 1s. 11d. per yard.

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Roller Towelling, 3½d. per yard; Surplice Linen, 8½d. per yard; Linen Dusters, 3s. 3d.; Glass Cloths,

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Samples, Post Free.

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JEWSBURY & BROWN'S

ORIGINAL AND CELEBRATED

ORIENTAL TOOTH PASTE

Has been used in the highest circles over 60 years for cleansing, beautifying, and preserving the teeth and gums to old age.

Sole Proprietors and Makers, JEWSBURY & BROWN, Manchester.

WHITE AND SOUND TEETH INSURED.

The ORIENTAL TOOTH PASTE is composed only of vegetable substances, blended with fragrant compounds. It is distinguished by its extraordinary efficacy in removing tartar, insuring to the teeth the most BEAUTIFUL and PEARLY WHITENESS, and inducing a healthy action of the gums. The ORIENTAL TOOTH PASTE gives PECULIAR FRAGRANCE TO THE BREATH, and will preserve the teeth and gums to OLD AGE. Pots, 1s. 6d., or Double Size, 2s. 6d. KEEPS PERFECT IN ALL CLIMATES.

OF ALL PERFUMERS AND CHEMISTS.

CAUTION.—Observe the name and address on the Pots, also the Trade Mark (J. & B. in a double triangle). Without these none are genuine.



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And of all Chemists and Wholesale Houses.

20s. for a QUARTER-CASK, i.e., 12½ Gallons
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Tyrer's
"BOROUGH"
Ketchup

SENT FREE
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"Sir,—I have been using the 'Borough' Ketchup, and am very pleased with it. Its flavour is excellent both for all kinds of Savoury Dishes and Soups; and I most certainly should advise every cook and housekeeper to use it, FOR I HAVE NEVER MET ITS EQUAL.—Yours truly, MARIAN SMITHARD, *Lectress on Cookery.*

CHAS. G. FOOT, Esq., M.D., of Tullow, Co. Waterford, in a letter says: "I shall recommend it to parties in this locality."

Copy of Analysis, June, 1882.

"The sample of Ketchup has been examined, and we are pleased to say that it contains nothing injurious or in any way objectionable to the constitution. Remark,—Very good.—Anti-Adulteration Company.

"Your very excellent 'Borough' Ketchup."—MADAM BARBARA W. GOTHARD, *Lecturer on Cooking at the Alexandra Palace, N.*

Proprietor of a large Restaurant in Glasgow, writing on August 18th, 1882, says: "It pleases very well."

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A Gentleman at Yalding, after receiving a cask, in September, 1882, writes: "I am very pleased with your 'Borough' Ketchup,—will answer every purpose I want it for."

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A Chemist at Haslingden, August 2nd, 1882, writes: "The Ketchup has suited me well, and I shall certainly write for more when requiring it."

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Have for several years supplied FOUR STANDARD QUALITIES of their **PURE TEAS**—

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ANTI-DYSPEPTIC COCOA OR CHOCOLATE POWDER.

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The FACULTY pronounce it “the most nutritious, perfectly digestible beverage” for BREAKFAST, LUNCHEON, or SUPPER, and invaluable for Invalids and Children.

Cocoatina is the highest class of Soluble Cocoa or Chocolate, with the excess of Fat extracted Mechanically.



Being all Cocoa it is four times the strength of preparations thickened yet weakened with arrowroot, starch, etc., and in reality cheaper than such mixtures.

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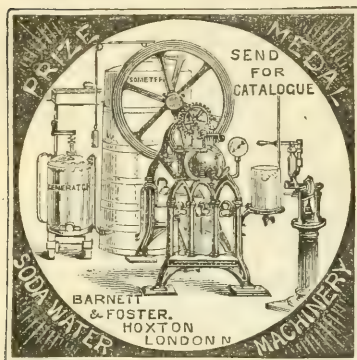
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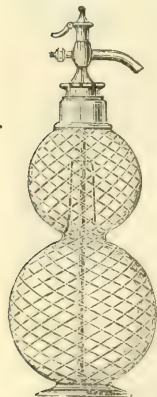
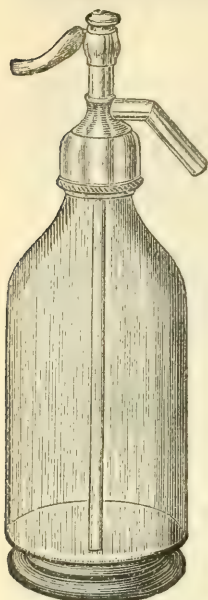
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